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The AUTOMOBILE

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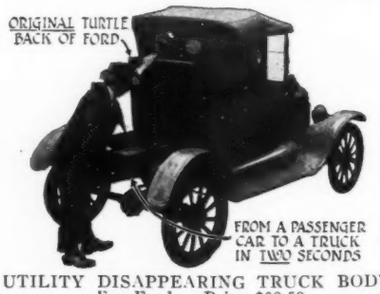

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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XXXIX NEW YORK—THURSDAY, DECEMBER 26, 1918—CHICAGO NO. 26

Political Plan of Organization Satisfactory

For Relatively Small Establishments

Combined Work of Employees' Representatives and Supervisors' Committee Suggests Added Values—A Typical Method Reviewed

By Harry Tipper

IN all organizations gathered together for common purposes it is necessary that certain disciplinary measures be agreed upon as a basis for the organization. In order that the group may operate together it is necessary that for certain specific causes the right of discharge should be maintained without review.

For this reason practically all the legislative organizations which have been adopted by various individual concerns have stated in the agreement that the right to discharge is not changed by the formation of the organization and that for certain causes varying to some extent with the necessities of the work immediate discharge without review is the result.

Causes for Immediate Discharge

In an oil company the carrying of matches onto the refinery premises contrary to the fire rules and the necessary safety may constitute a reason for immediate discharge without review where such an item would not be an infraction of the rules in other lines of business.

In general, the causes for which an immediate discharge without review is retained in the preamble agreement to these organization developments group themselves under three heads:

1—Those disciplinary measures required by law. In general this is stated in so many words in the agreement between the employer and the employee requiring an obedience to all regulations prescribed by the State and national laws governing the working conditions in the industry affected. This, of course, is absolutely necessary not only that the legal requirements may be fulfilled but in order to provide a basis for the observance by the individual employees of any regulation which may be imposed by the legislative organization within the industrial unit. It is obvious that the basis for orderly agreement within the industrial unit must be a strict observance of the regulations imposed by the political government of which all industrial units are a part.

2—Those measures demanded by the insurance companies and other bodies as a corollary to protection against damage. These regulations come in the same category as the legal restrictions previously mentioned, but they are usually stated specifically so that they may be thoroughly understood by the employees and their observance agreed upon in the case of each particular rule.

3—The third division included in the causes for immediate discharge without review is peculiar to the industry in which the unit is engaged and in some cases peculiar to the organization. In it are present those items which in the opinion of the governors of the industrial unit and the representatives of the employees are sufficiently serious to eliminate the man as a useful member of the industrial organization and therefore unworthy of any reconsideration.

This point is quite important, as it is obvious that a

constant review of cases which relate to infractions of rules which are for the general benefit of the body of workers and the operations of the industry, loading the committees with the necessity for examination of matters so obviously detrimental would work a constant hardship on the orderly part of the organization and result in a reduction of the benefits to be derived as well as a lack of operating discipline.

The example organization plan which we are considering in this article has been picked out because it has been used in several cases of organizations involving a small number of employees where the difficulties of meeting are not so severe and where the operations of the legislative organization can be handled from the point of view of closer contact and understanding.

As in most of the new forms of organization, this example follows the political organization as it is represented in the arrangement of Congress. It follows the lines, however, much more closely than some of the organizations which have been adopted in the machinery business, and it is of much longer standing.

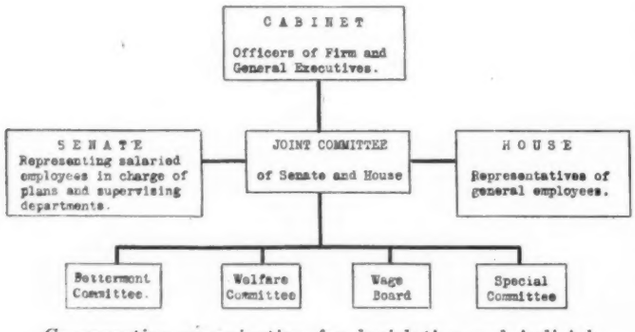
The original organization plans were made in 1914. They have been running for nearly 4 years. This is important in considering the value of the plans, as time must be allowed for the shaping together of such an organization before it will fulfill properly all the functions for which it has been created.

The general plan of this organization exactly parallels the political organization of the United States, consisting as it does of a House of Representatives taken from the body of general employees by election, a Senate representing those salaried employees who are in charge of the execution of the plans of the company, and the supervision of departments, and a Cabinet representing the officers of the firm and the general executives.

In fact, it goes further in this direction in that it calls for a joint standing committee appointed by the House and the Senate to act in a similar way to the conference committees of the House and Senate of the United States in bringing an agreement upon matters of importance before they are submitted to the Cabinet.

The only difference between the organization for legislative purposes in this company and the political organization under which we all live is the lack of provision for the carrying of a regulation or policy over the veto of the Cabinet. But in practice this is not very important, as the combined agreement of the House and Senate upon a matter has been accepted as usual practice and put into operation by the Cabinet.

There is one example in this country of a legislative organization in a business which provides for the carrying into the operations of the company of a policy agreed upon by a two-thirds majority over the veto of the board of directors, and in the case of this one example the lodgment of that much power in the hands of the employees has been highly successful. However, it is hardly necessary that this should be followed in the present state of industrial organization and it should grow out of the workings and values of the organization rather than be included in the plan which is stated.



Co-operative organization for legislative and judicial functions

There are a number of points which should be called to the attention of the man who is interested in labor developments in this type of organization. It has been used mainly in organizations of a smaller size carrying on the payrolls less than 1000 workers, and some of its provisions would not be applicable to organizations of a much larger character. It has been used also where the turnover is not quite so large as the usual percentage to be observed in the machinery industries and where the permanence of the employees has resulted in an agreement and a co-ordination that will be impossible for a long time in the machinery industries where the turnover is so large.

Election of Members

To be eligible for election to the House of Representatives an employee must have been in the employ of the company continuously for at least 6 months. An indication of the permanence of employment in this business is to be found in the fact that over four-fifths of the employees are eligible for election.

It is to be noted that every department of the company is privileged to elect one representative no matter how small a department may be. This is a significant departure from the plans which have been presented so far emanating from the machinery and metal industry, where the election of representatives is determined by the plant or geographical location and not by departments.

One representative is allowed for each fifteen employees in a department. The small number of employees to each representative is, of course, governed by the smaller size of the establishment and has no particular bearing upon the success of the scheme.

The procedure in developing the Senate is quite different. There is no election in this case, but an appointment by the members of the Senate by a majority vote after the applicant has secured the endorsement of the firm and not less than one member of the Senate. The Senate, in other words, represents the detailed operating supervision of the organization, and its value arises out of its familiarity with the necessities and conditions in each department and not out of the fact that it consists of employees. All members of the Senate having charge of plans and supervision are representatives of the officers, equipped, however, with a much more intimate knowledge of the necessities and the conditions.

This provision of the Senate as a standing body is an extension of the conference system among department heads so as to bring it into co-ordination with the House of Representatives as a part of the legislative machinery. It will be noted that here again there is a definite departure from the practice as outlined in the plans of the machinery and metal organizations which have been created during the last 3 years.

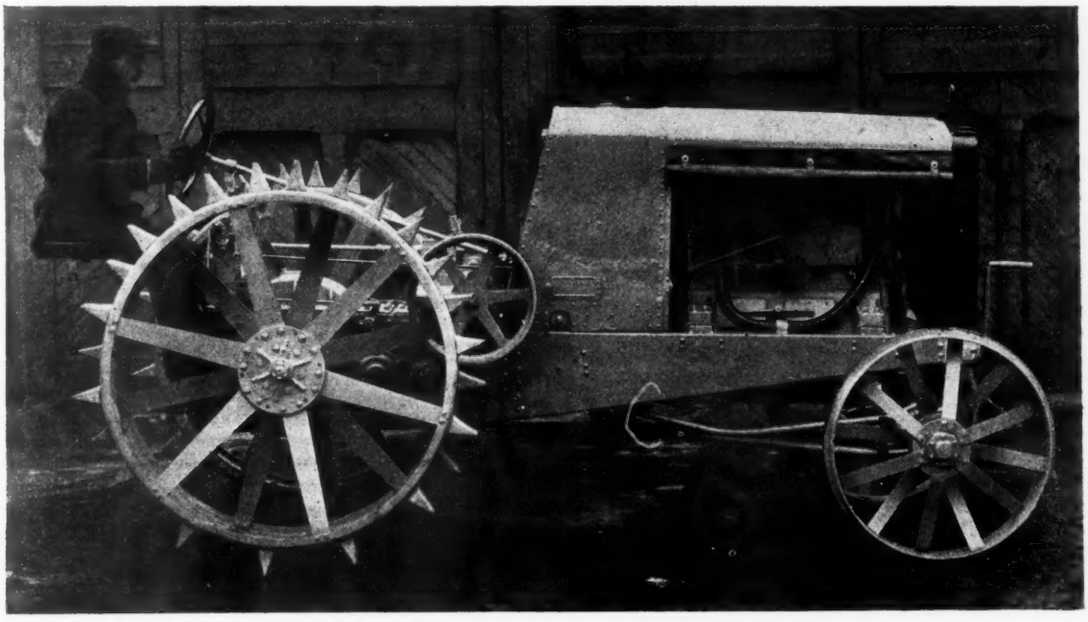
Of course it is true that in most of these large concerns in the machinery and metal fields the conference and committee system between heads of departments is a regular part of the business procedure, but so far as we have been able to observe it has not been co-ordinated definitely with the other machinery as a part of the legislative organization.

It seems as though the knowledge of those supervisors who are handling the detail operations of the various departments of a manufacturing organization would be able with their knowledge of the intimate conditions to

(*Continued on page* 1088)

S. W. H. Tractor a New Cleveland Product

A 3-Plow Machine with Pressed Steel Semi-Frame Bolted to Front End of Transmission Housing—Engine and Transmission Independent, Insuring Accessibility



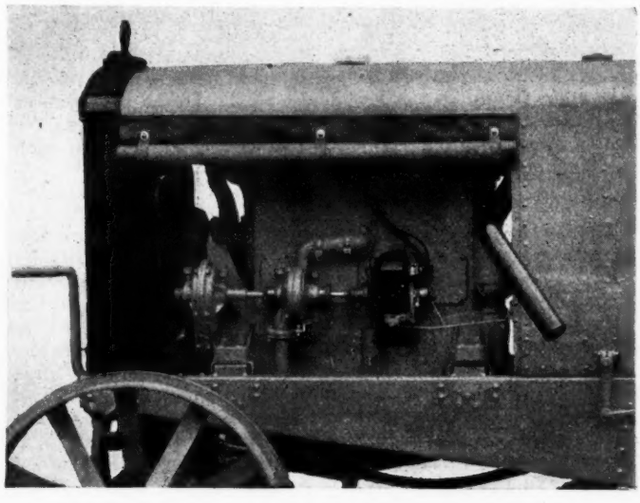
Accessibility is a feature of the new S. W. H. 3-plow tractor. About 30 per cent of the weight rests on the front wheels

DURING the past year a striking departure has been made in tractor development. Very few of the newer tractors have the channel steel frames, built-up front axle and other remnants of the experimental period of tractor history. In fact, the later models show much evidence of careful design and are less indicative of attempts to produce something strikingly original. Smoothness of lines and protection of all working parts against dust, etc., have become more marked features.

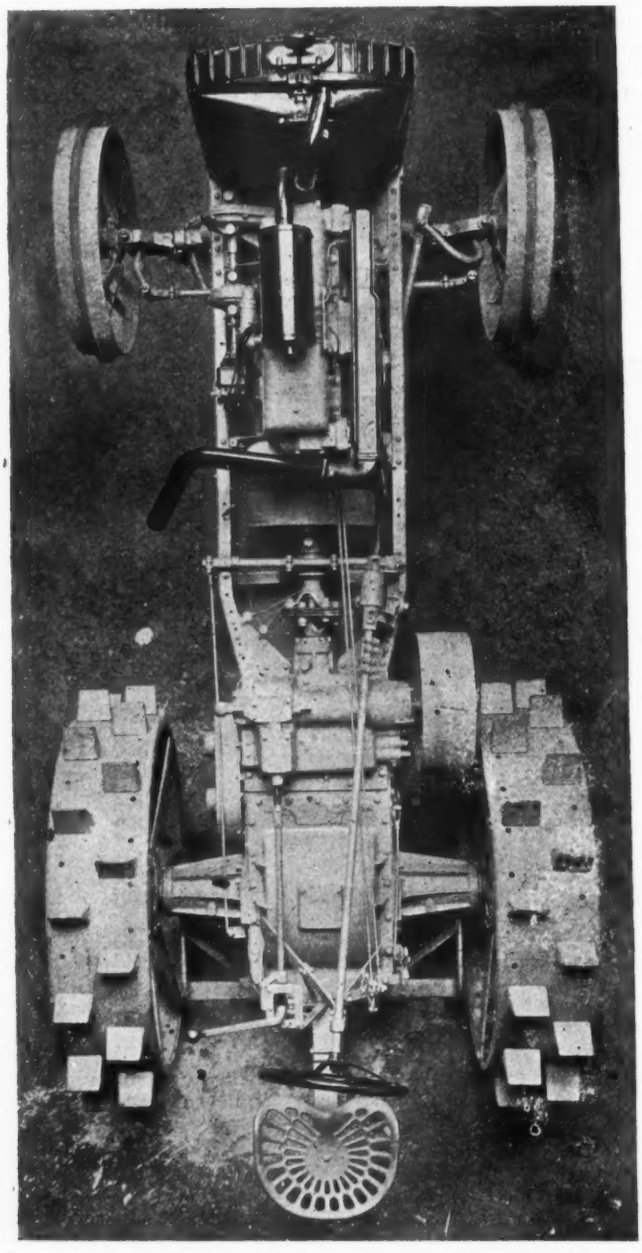
A new tractor of strictly modern lines has just been announced by the S. W. H. Engineering Co., Cleveland, Ohio. It is a 3-plow tractor of the four-wheel type, and we are informed that its design was laid down only after a careful study of what farmers actually require of a tractor and what others had done to produce a machine to meet these requirements.

Novel Frame Construction

One of the most interesting features of the S. W. H. tractor is its frame construction. The housing for the transmission and rear axle is a single casting. The rear axle shafts extend through this housing at the rear, and are supported in bearings carried in cast iron extensions bolted to the housing on both sides. The front end of the transmission case is machined off flat, and to the faced surface thus formed is bolted the rear end of the frame. As the rear end of the frame members is of very deep section, this makes a very rigid construction. The frame supports the engine, radiator and other minor parts. Near its forward end there is a cross member to the center of which are riveted two brackets, forming a swivel support of the front end of the frame on the front spring. As a result of this swivel support of the forward end of the tractor, the wheels can accommodate themselves perfectly to any unevenness of the ground, and the spring support protects the forward end of the tractor against undue shocks and jars. About 30 per cent of the total weight of the tractor rests on the front wheels, and the frame members were designed to take care of this load. To combine lightness with strength, the frame members are made up of 3/16 in.



The S. W. H. engine is of stock type, designed to use kerosene



A novel form of frame construction is employed

pressed steel, the section tapering from the forward to the rear end. Owing to the low depth of the frame members at the forward end the steering lock is not unduly restricted. We understand that a patent on this frame construction has been applied for.

Engine a Stock Type

The engine is a special heavy duty tractor type, designed to burn kerosene. It is a four-cylinder engine of 4¾ in. bore by 6 in. stroke, and is of the valve-in-head type. All moving parts are inclosed. There is pressure feed lubrication to the main and connecting-rod bearings and all other parts are lubricated by splash. The crankshaft is of large diameter, and is carried in bronze-backed, babbitt-lined bearings. Ignition is by a high tension magneto with impulse starter. The carbureter—a Stromberg plain tube type—is located as close to the engine as practicable, and all the air drawn in is first passed through an air cleaner so as to remove all particles of dust and grit. Fuel feed is by gravity. A supply of 30 gal. kerosene is carried and in addition 3 gal. of gasoline. The engine is of the open flywheel type, which permits of ready access to the clutch and even of the removal of same without disturbing any other part. On the forward part of the engine is carried a 21-in. radiator fan, which is driven by a wide flat belt.

An integrally built governor of the fly-ball type maintains the engine speed at 900 r.p.m., at which speed the engine develops approximately 37 hp. The governor is completely enclosed, and is said to be very sensitive, governing the engine speed within very close limits. An oil pressure gage is mounted on the rear of the fuel tank, where it can at all times be readily seen by the operator, and indicates the pressure under which the oil is fed to the bearings. This pressure normally is about 30 lb. per sq. in.

Thermostat and Motometer

Special attention has been given to the design of the cooling system. The tractor is equipped with a Modine spirex radiator, having a core measuring approximately 22 by 23 in. The shell of the radiator is an integral iron casting, and has the core secured to it by 8 cap screws, so that after taking out these screws the core may be removed from the shell. The radiator is provided with a large filler spout with quick opening cap and motometer. To the back of the radiator is fitted a hood or shroud, in which turns the 21 in. fan, the provision of this hood tending to increase the efficiency of air circulation through the radiator. The water is circulated by means of a centrifugal pump, and a thermostat is installed to regulate the temperature of the cooling water in the engine jacket. Maintaining the engine cylinders at a uniform high temperature, not only increases the efficiency, but also tends to facilitate the burning of kerosene.

The clutch used is a Borg & Beck dry plate type, 12 in. in diameter, and is carried directly in the flywheel of the engine. By reason of the special frame construction, this clutch can be removed without disturbing the engine or transmission. Between the clutch tail shaft and the transmission primary shaft is incorporated a Thermoid three-disk flexible coupling. The disks of this coupling are of Sea Island patent fabric, and rubber. They are 5/16 in. thick and 8 in. in diameter, and they furnish a very strong flexible connection between clutch and transmission. Not the least advantage of this flexible coupling is that it materially relieves shocks in case the clutch grabs or the load on the tractor suddenly increases by the plow striking rocks, stumps, etc.

Rear Axle and Transmission One Unit

The rear axle and transmission form a single unit. The transmission is of the inclosed, spur gear type, and all shafts are mounted on anti-friction bearings, both Hyatt roller and ball bearings being used. All gears are cut and heat treated, and are fitted to splined sections of the shafts. The gearing within the transmission housing affords two forward speeds and one reverse. However, on the outside of the housing there is a pair of gear wheels, under a quick removable cover, which can be interchanged in order to obtain a smaller reduction to the rear wheels. With the standard set of gears (28:34) the reduction ratio from the engine to the rear wheels on low speed is 54.5:1, which corresponds to a tractor speed of 2 1/3 m.p.h., while the reduction ratio on the high gear is 37:1, which corresponds to 3½ m.p.h. If the cover over the outside pair of gears is removed, and these gears are interchanged, the low speed reduction will be reduced in such a way as to give a tractor low speed of 3½ m.p.h. and a high speed of 5¼ m.p.h. It is thus possible by means of the interchangeable set of outside gears to get a speed range of from 1½ to 9 m.p.h. The regular plowing speed is 2 1/3 m.p.h., which is obtained at an engine speed of 900 r.p.m. There is said to be a marked tendency toward higher plowing speeds, and this tractor will make such speeds available as soon as the moldboard plow is adapted for operating at higher speeds. At 2 1/3 m.p.h. the tractor develops maximum drawbar pull of 3500 lb. and a sustained drawbar pull of 3000 lb., and at 3¼ m.p.h., the sustained drawbar pull is 2000 lb.

Power Take-Off

The belt pulley, which is 18 in. in diameter with 6½ in. face, is driven through a pair of bevel gears, and is controlled by the same friction clutch as the drive to the rear wheels. It turns at 550 r.p.m., which corresponds to 2600 ft. per min.

belt speed. A sliding gear renders the power take-off inoperative when the tractor is in motion. The differential used is of the same dimensions as that of the Class B standard war trucks. A contracting brake is fitted to the differential, to permit of holding the tractor on bad hills and of locking it in position while doing belt work.

The rear axle drive shafts are 3 in. in diameter, and are machined with a long taper to which the wheels are fitted. A rather unconventional type of drawbar is provided. This is made of flat bar stock, bent up yoke-shape, and is secured to opposite ends of the axle housing. It is braced at the corners to insure the necessary rigidity. In addition to serving as a drawbar, this piece serves also as a step for the operator. The height of the hitch from the ground is 17 in., in accordance with the S. A. E. standard, and the drawbar has a lateral adjustment of 24 in.

The front axle, which is of the company's own design, is a steel drop forging of I beam section, heat treated. The steering knuckles are also drop forgings, and are provided with renewable bushings through which pass the hardened and ground steering pins. The weight of the machine is transmitted to the front wheels through liberal sized thrust bearings on top of the steering knuckles, inclosed so that they will always be submerged in oil. The tie-rod is tubular, of large diameter, and carried back of the axle, where it is protected against injury. The clevises at both ends of this rod are fitted with hardened and ground pins, turning in removable bushings inserted in the end of the steering arms.

Front End Spring-Mounted

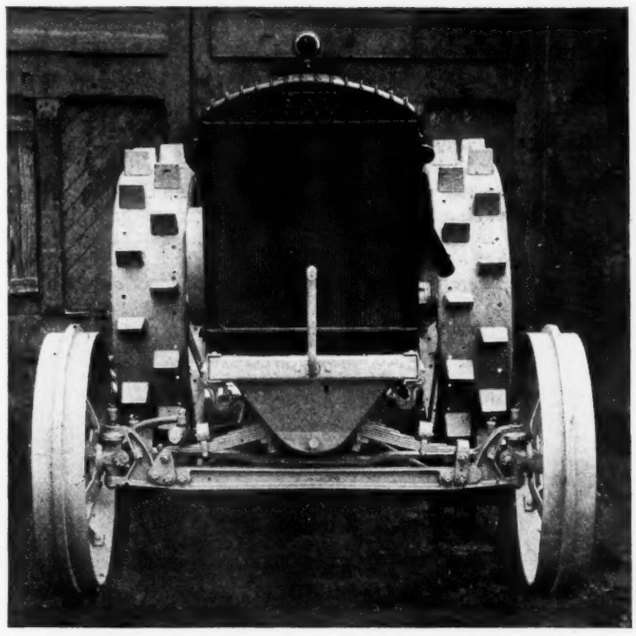
A half elliptic cross spring, 35½ in. long by 2 in. wide, supports the forward end of the tractor on the front axle. This spring is located directly above the axle, its right-hand end being connected to the axle by means of a spring bolt and two plates, and the other end swinging on shackle links. Self lubricating bushings are fitted in the spring eyes and in the hole in the front axle. The spring is made comparatively long in order to apply the weight to the axle as near the wheels as possible, and thus reduce the bending moment on the axle. A hole is drilled near each end of the axle to receive the wishbone type of radius rod construction. These radius rods are tubular and are provided with forged connectors at the forward end, secured into the axle. At their rear end the two tubes connect to a single forging, which is formed with a ball of 2 in. diameter, this ball being supported in a socket secured to a cross member of the frame. Thus the front construction is absolutely free to accommodate itself to uneven roads.

The second cross member from the front end is an inverted channel section and has riveted to it the bracket for the front spring. The second cross member from the rear is of deep channel section and has the spherical socket for the triangular radius rod riveted to it. The center line of the front spring hinge pin produced passes through the center of the ball, thus insuring a high degree of flexibility. This cross member is connected with the rear cross member by a central channel piece so that the thrust on the front axle is taken directly against the front end of the transmission case. Just back of the second rear cross member the frame tapers toward the center slightly and the rear end of the frame is composed of a large plate, the upper and lower edges of which are flanged over so as to form a channel and the two ends attached to the frame are also flanged and riveted rigidly to the side rails. Two gussets brace the upper flange of this cross member to the frame side rails and a continuous flat plate forms a gusset between the second rear cross member, the frame sides and the back member. Suitable additional reinforcements are used in the corners of the rear plate.

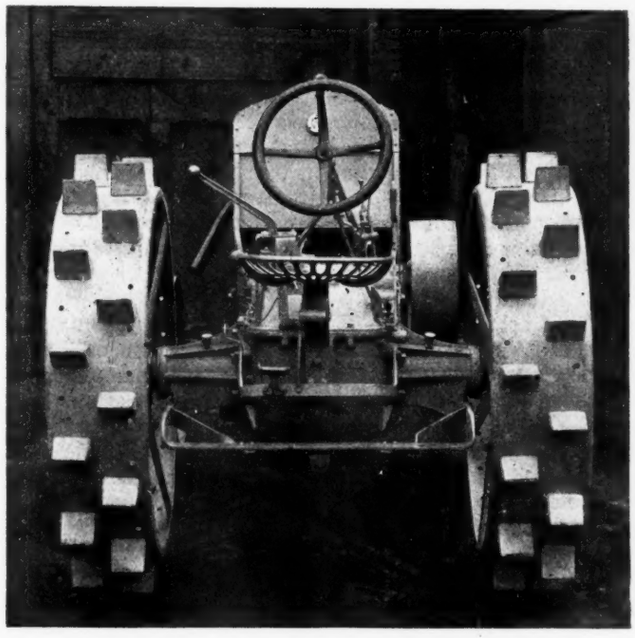
Connection Between Frame and Transmission

The rear plate of the frame is drilled to take ten ¾-in. cap screws, and the frame is bolted directly to the front face of the transmission. The whole design of this frame is such as to insure great rigidity while at the same time it is light.

Front wheels of 30 in. diameter and 6 in. width of face are fitted, these wheels having rims ⅜ in. thick. A mud band of 1 in. square cross section is shrunk over the rims of these wheels at their middle in order to insure more positive steering. The hubs are malleable castings, and are bored out to take removable Hyatt liners. Each front wheel is mounted on two Hyatt roller bearings, and the thrust is taken on plain thrust washers of large diameter, care being given to the inclosure of these bearings so as to exclude dust and retain lubricant. Flat spokes are used.



A semi-elliptic cross spring supports the forward end



Rear axle and transmission form a unit. Transmission is enclosed

The rear wheels are also of the flat spoke type, the spokes being riveted to rolled and flanged steel rims, 48 in. in diameter with 12 in. face and ¼ in. thickness. The hubs are of malleable iron. The rear wheels are secured to the axle drive shafts by means of taper, key and nut. The rear wheel rims are punched to take either grousers or angle cleats, whichever is most suitable for the condition of the ground on which the tractor is to work.

Control Details

In view of the fact that tractors often must be operated by boys and women, the designer of the S. W. H. tractor has

made special endeavor to render the control easy. All of the control members are centralized so that they can be easily reached from the driver's seat. A wide flat spring, secured to the rear end of the transmission case, carries the driver's seat. It is provided with a safety leaf and a rebound clip. The steering post, which is supported by a triangular bracket on the transmission case, is very strongly inclined, and has secured to it a 17 in. diameter steering wheel with wood rim. Spark and throttle control levers are mounted directly underneath the steering wheel, on the steering post bracket, and are operated by the right hand. The brake in the transmission is operated by a lever within easy reach of the operator's right hand. The clutch throwout treadle runs entirely around the rear of the transmission case, and may be actuated by either foot. The gear shift lever is located slightly to the left of the steering wheel, and is operated by the left hand. It operates in a control gate or quadrant which has the different positions marked upon it. When the tractor is at rest, the lever is in the neutral position, and in order to pick up one of the speeds, all that is necessary is to slide the lever forward or back, to register with the correct slot, then to swing it toward the center of the tractor.

The S. W. H. tractor has a wheel base of 90 in., a tread at the front wheels of 56 in. and a tread at the rear wheels of 52½ in. Its overall dimensions are as follows: Width, 64½ in.; length, 12 ft. 2 in.; height, 5 ft. 6 in. The minimum ground clearance is 13 in., and the weight of the tractor without lugs, water or oil, is 4525 lb. The spade lugs weigh about 100 lb. per wheel, so the tractor as shown in the illustration weighs about 4725 lb.

Political Plan of Organization Satisfactory

(*Continued from page* 1084)

arrive at an agreement with the employees' representatives so that the matter submitted to the Cabinet would represent not merely a demand from the employees but an agreement between all those immediately concerned with the matters discussed.

Under this plan it would seem that the time of the general executives and the officers of the company could be conserved that the agreements would be arrived at more rapidly, a great many matters disposed of without reaching the heads of the institution and in addition the minor executives would be trained thoroughly in the methods of handling human relations in industry to the great advantage of the whole institution.

It will be noted also that in this plan the jurisdiction of the House and Senate is not restricted to the discussion of certain matters but that it may consider any matters that affect the interests of the employees or the concern. This has, of course, its disadvantages as well as its advantages.

If the organization were not functioning properly a great deal of time might be wasted by the discussion of matters which would be impossible of solution and the intrusion in affairs which concerned the operations and not the legislation of the business.

On the other hand, the agreement between the employees and the supervisors through the medium of the machinery provided in this way might be carried much further and conduce to a much greater degree of understanding without the limitations which are usually imposed upon the business of such bodies.

In actual practice it has developed that in the course of the 3 or 4 years the members of both bodies have come together sufficiently in their understanding of the value of these bodies and their use of the machinery so that their discussions are devoted to things which are pertinent and their agreements have been valuable to the business.

The judicial procedure in the review of complaints carries a complaint to a sub-committee of a joint conference committee consisting of an equal number of representatives from the House and the Senate which reviews the case and makes a decision. If this review is not satisfactory to the employee he may appeal to the House and Senate which then appoint a special board for the purpose of acting upon the case, this board consisting of two members of both houses and a fifth brought in by mutual consent. The decision of this board is final. It may reinstate, it may discharge, but there is no appeal from its decision.

The writer has been struck with the number of appeals which are allowed in the judicial procedure of some of the co-operative organizations developed. It is not wise that individual grievances should be permitted to pass through a judicial process which may defer the final action for a long period of time. Neither is it wise that employees should be able to appeal from one court to another on insignificant and ridiculous pretext because of some dissatisfaction with the result.

It looks as though one review and one appeal should enable most cases to be judged fairly and disposed of justly, besides accelerating the decision so that the final action can be taken within a reasonable period and the employee notified of the results in his case.

This is a very important point as there is a possibility of a great deal of dissatisfaction in the adjustment of personal grievances and the dissatisfaction can be vastly increased by the length of time through which it is possible to appeal a matter from one body to another.

In the interests of both supervisor and employee the procedure should be as just as possible and also as rapid, and its limitation of the judicial procedure to two boards of review and decision is recommended to the reader's attention as a suggestion of advantage in the development of this type of organization.

In these cases where plans have been in operation for several years it is possible to measure the value of their actions to a degree which would not be possible in the case of the newer developments in this respect. There is considerable detailed information as to the action of these organizations upon wages, upon hours, holidays, etc., which will make it possible to determine the success with which they have attacked some of the problems. The consideration of these items will therefore be left over to the next article.

Production of Rubber in Fiji Islands

ACCORDING to a published statement of His Majesty's Trade Commissioner to New Zealand, who has lately visited the Fiji Islands, the rubber industry is receiving much attention in those islands, and New Zealand farmers have planted large plantations there that have produced quantities of rubber reported to be of a very high grade. It is claimed that there are thousands of acres in the Fiji Islands that are well adapted to this industry, and it is expected that extensive developments will follow. The price of rubber at present seems very low, since the market is so greatly restricted because of the war, but it is expected when normal conditions are restored that this will become a profitable industry in these islands, where labor is comparatively cheap.

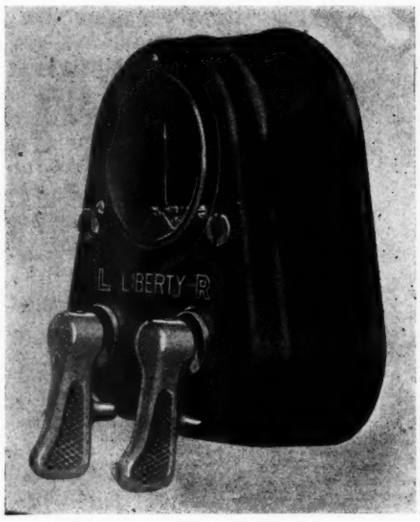
Electrical System of the Liberty Engine

Generator and Battery Supply the Current for Ignition—Special Type of Interrupter Used Comprising Three Breakers in Parallel—Storage Battery Designed to Permit of Upside-Down Flying

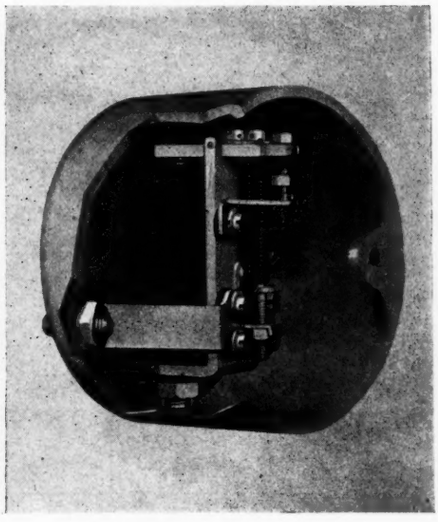
By J. Edward Schipper

ONE of the most interesting engineering problems that had to be dealt with in working out the details for the Liberty aircraft engine was that of the electrical system. After much discussion it was decided to use the generator-battery type of ignition. A special design of the Delco system was produced, which has given excellent satisfaction and which incorporates ingenious features which may eventually prove to be of use in commercial fields.

The system consists of a low-voltage generator, a voltage regulator, an extremely light-weight battery, a double distributor system, duplex switch, and the various units necessary for the control of the apparatus. Referring to the previous article on the Liberty engines, which appeared in AUTOMOTIVE INDUSTRIES of December 12, the generator is driven from the vertical shaft which also drives the oil and water pumps. The regulator is so designed that it keeps the voltage between 10 and 10½ volts. The generator operates in conjunction with a special light-weight Willard or Exide 8-volt battery which supplies electrical energy for starting and while idling at low speed. Above 650 r.p.m. of the engine the generator supplies all the current required for ignition and charges the battery.



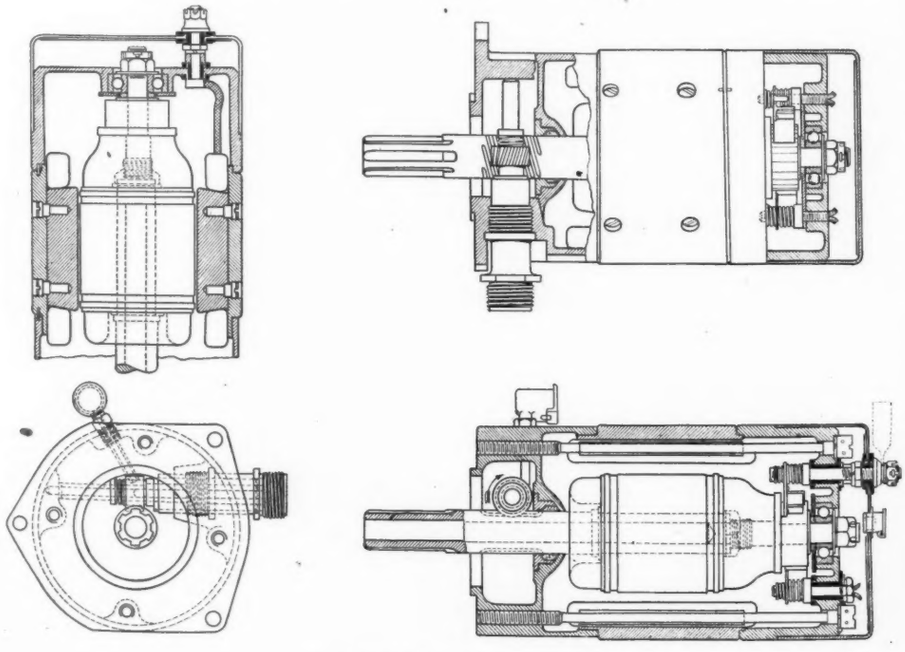
Combination switch and ammeter



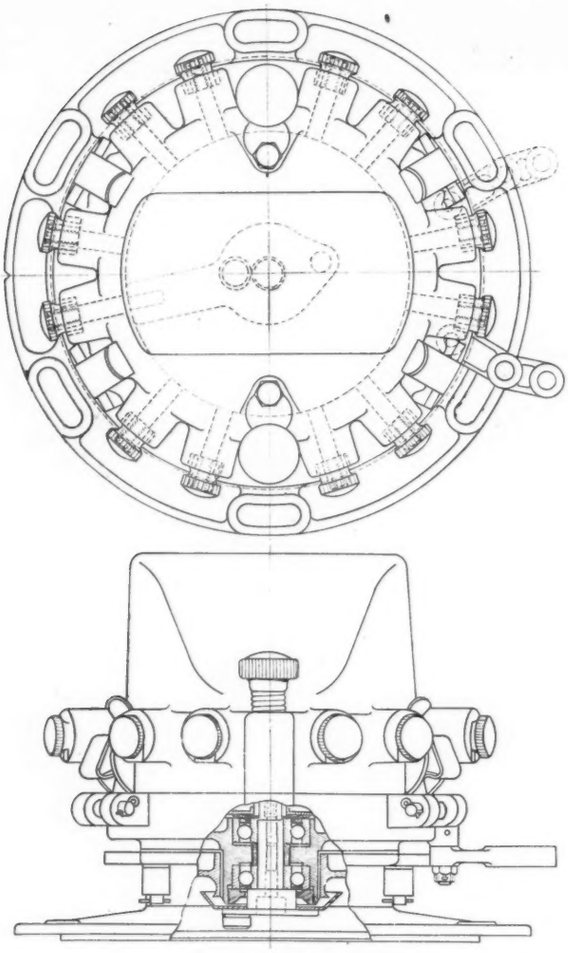
Voltage regulator back of switch

The ignition system is double, there being two spark plugs in each cylinder, as well as duplicate distributors, which latter are mounted upon the camshaft housing of the engine and driven directly from the camshaft. The two distributors are ingeniously synchronized. Each cylinder receives sparks from both distributors, the right hand distributor supplying the plug nearest the distributor and the left-hand distributor the plug nearest the propeller.

The current is controlled through a duplex switch. Either switch lever, when used alone, causes the battery to supply the ignition current. When both switches are turned the generator is automatically connected in circuit. As the generator does not furnish sufficient current to carry the ignition load, when the engine is running at less than 650 r.p.m., it is not advisable to turn both switches on at such speeds, since this causes the battery to discharge through the generator. Thus, starting is accomplished by turning one switch handle, and when the engine is running at above 650 r.p.m. the second switch lever is turned to the "on" position, so that the current will then flow from the generator. An ammeter is incorporated in the switch assembly.



Sectional views of generator



Two outside views of ignition unit

The generator is a four-pole, shunt-wound unit, mounted vertically on the engine crankcase. It is directly driven at 1½ times crankshaft speed. As indicated by the sectional view, the tachometer drive is incorporated in the generator base, being secured by means of a worm gear off the armature shaft.

The voltage regulator controls the generator field current through the magnetically operated regulator contact points. This regulator is usually mounted on the dash directly behind the switch and is connected in circuit as shown in the diagram herewith.

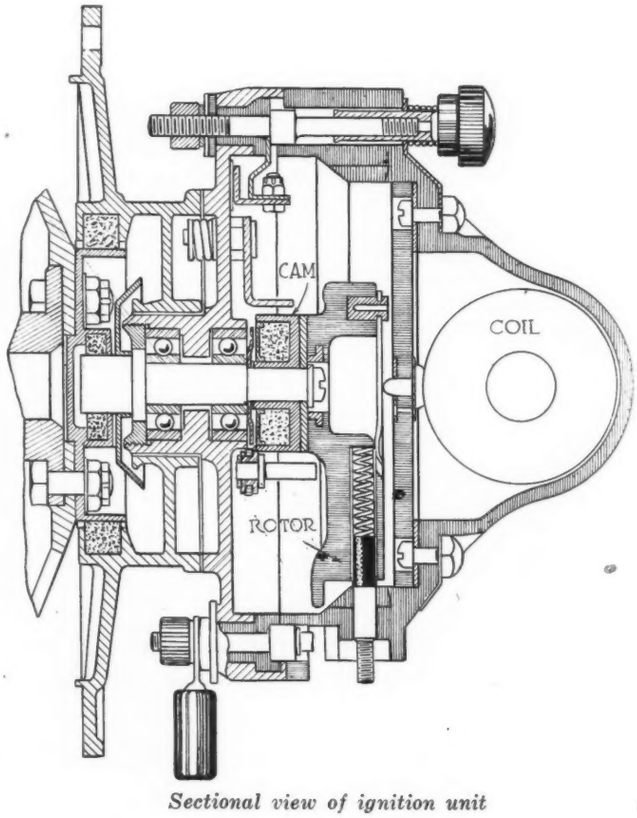
Probably the most interesting unit in the entire system is the breaker-distributor. Two distributors, each operated by the camshaft as described, provide each cylinder with two independent and simultaneous sparks at the duplicate plugs. The distributors are interchangeable and each distributor incorporates both an ignition coil, sealed in the Bakelite head, and the breaker mechanism. The timing range is 40 deg.—30 deg. advance and 10 deg. retard—measured on the crankshaft circle.

Both breaker mechanisms are operated by cams having twelve lobes, or one lobe per cylinder. The cam operates pivoted contact arms which close and open the low voltage circuit at the proper instant for firing. The unusual features of the breaker mechanism are the two main contact arms, each performing the same function at the same time for reliability, and, as a safety feature, an auxiliary contact arm which prevents the engine from operating in the reverse direction.

An illustration is given showing the arrangement of the two main contact arms and the auxiliary contact. The auxiliary contact arm is so set that when the engine is running ahead the auxiliary contact points break before the main contact points, so that the action of the auxiliary contact points has no effect whatever. Should the engine begin to rotate backwards, the auxiliary contact points will not separate until after the main contact points have separated. Since the auxiliary contact points are connected in series with a resistance, the current after the main contacts are broken is so weakened that no spark will result and the engine therefore cannot function in a reverse direction.

It is, of course, necessary in this arrangement that the two pairs of main contact points operate simultaneously in order to get synchronized sparks. To provide for synchronizing adjustment, the condenser-breaker plate, upon which the contact arms are pivoted, is arranged to swivel slightly, permitting as an adjustment feature one arm to advance before the other in their relation to the cam. This adjustment is secured by means of a clamping nut on the left side of the plate as shown in the illustration of the breaker mechanism. In adjusting the main contacts for simultaneous action, it is necessary that they are on the lobes of the cam at the same instant, and that the gaps between the contact points should be approximately the same. These contact points should be set so they separate not less than 0.010 in. nor more than 0.015 in. The average opening is 0.012 in.

An ingenious maintenance arrangement has been worked out to check the accuracy of synchronism by means of two 8-10 volt electric lamps, each in series with one of the main contact arms. The cam should be turned one complete revolution and the lamp should indicate the best average of synchronism. The firing order is illustrated in the diagram herewith, the cylin-



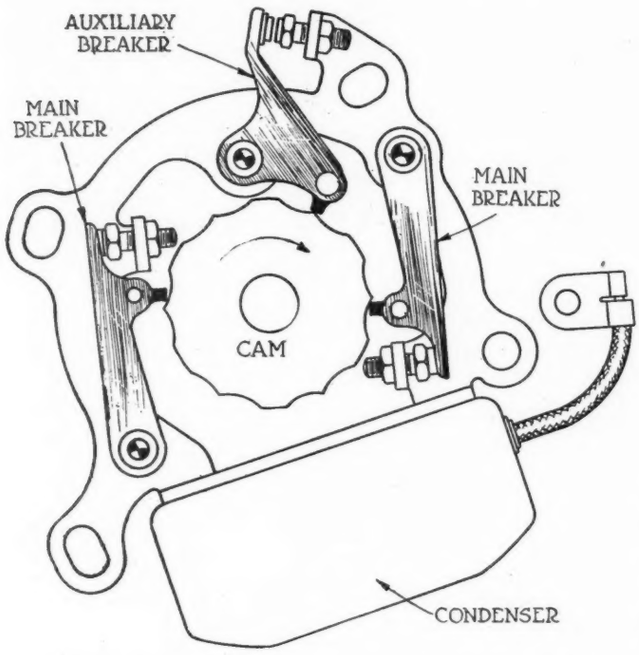
Sectional view of ignition unit

ders on the distributor end being referred to as 1L and 1R respectively, and those at the propeller end as 6L and 6R.

The firing order is as follows:

1	2	3	4	5	6	7	8	9	10	11	12
1L	6R	5L	2R	3L	4R	6L	1R	2L	5R	4L	3R

To take care of airplane requirements, a special light-weight battery was developed for the Liberty engine. These batteries are supplied by the Willard and Exide companies. They contain but very little electrolyte and may be turned upside down without harm. The battery is a four-cell type. The two types of battery vary slightly in detail, but in general principle they are quite similar. The battery is built within a double compartment, with the cells held in the lower part. The upper part of the receptacle forms an expansion chamber and at the same time helps to seal the battery. By means of this chamber the battery can be operated at various angles and positions without spilling the acid.



Arrangement of the three arms of the circuit breaker. The main breaker points are diametrically opposite and open simultaneously. The auxiliary breaker has a slight lead in normal running

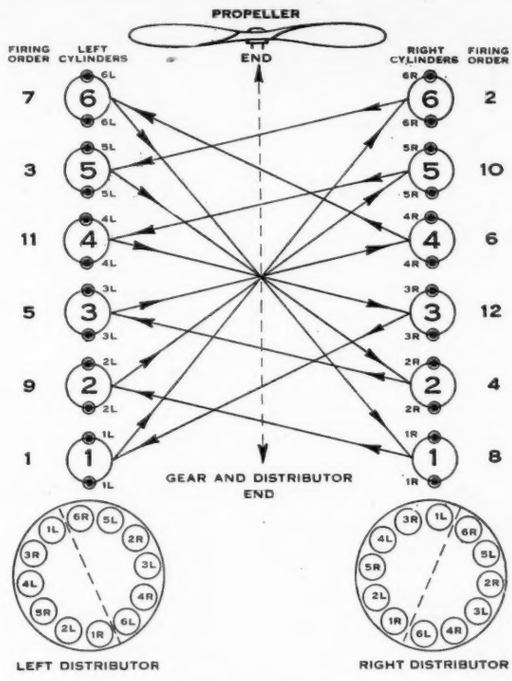


Diagram of firing order

Not the least of the problems connected with the development of the Liberty aviation engine was the design

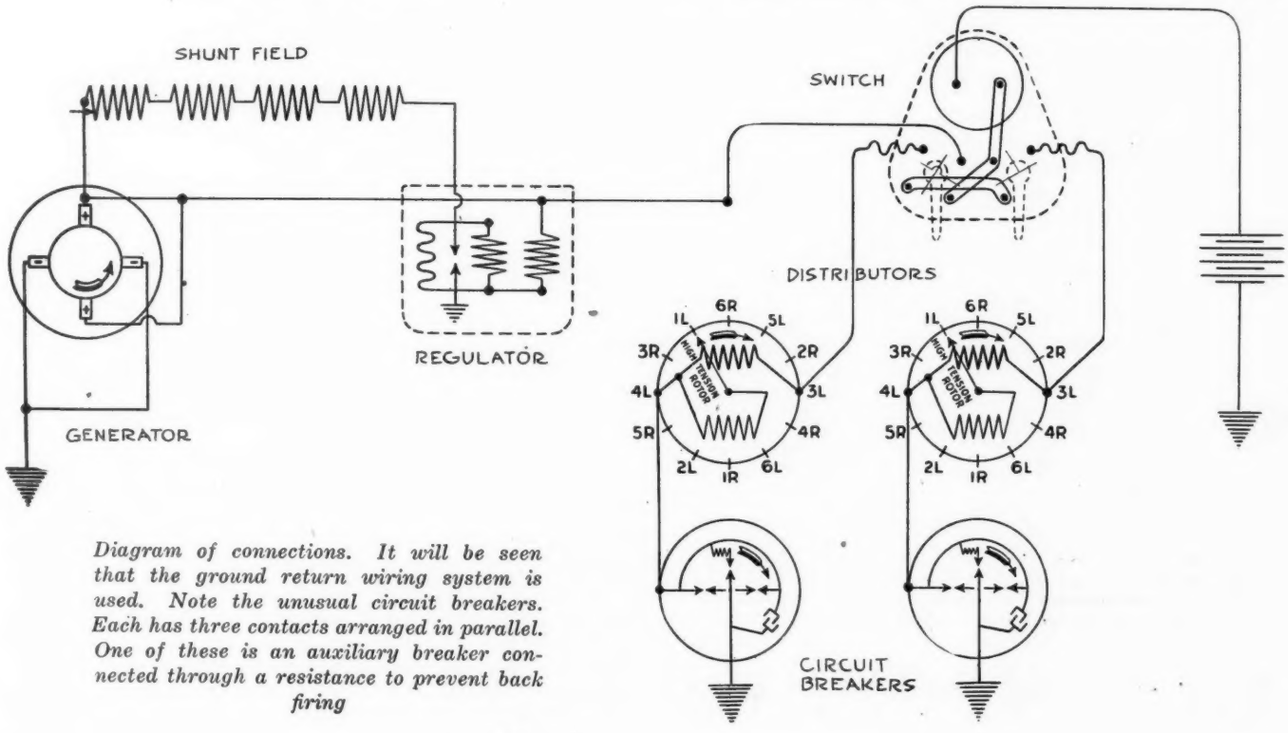
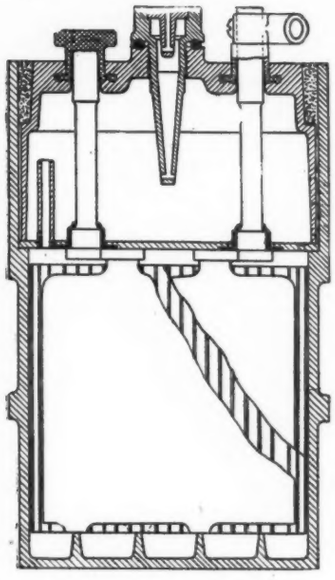
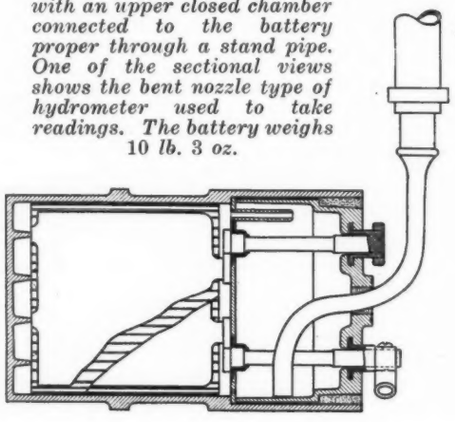
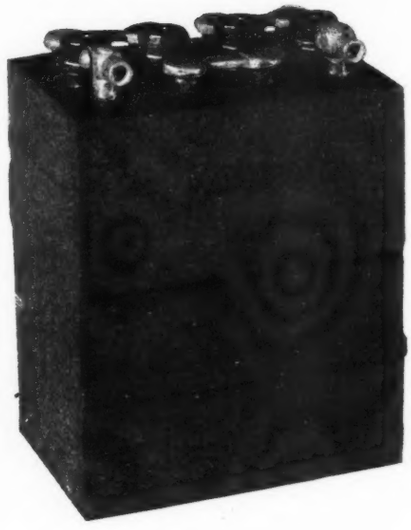


Diagram of connections. It will be seen that the ground return wiring system is used. Note the unusual circuit breakers. Each has three contacts arranged in parallel. One of these is an auxiliary breaker connected through a resistance to prevent back firing





To prevent spilling of the electrolyte in upside down flying the battery on the Liberty engine is provided with an upper closed chamber connected to the battery proper through a stand pipe. One of the sectional views shows the bent nozzle type of hydrometer used to take readings. The battery weighs 10 lb. 3 oz.



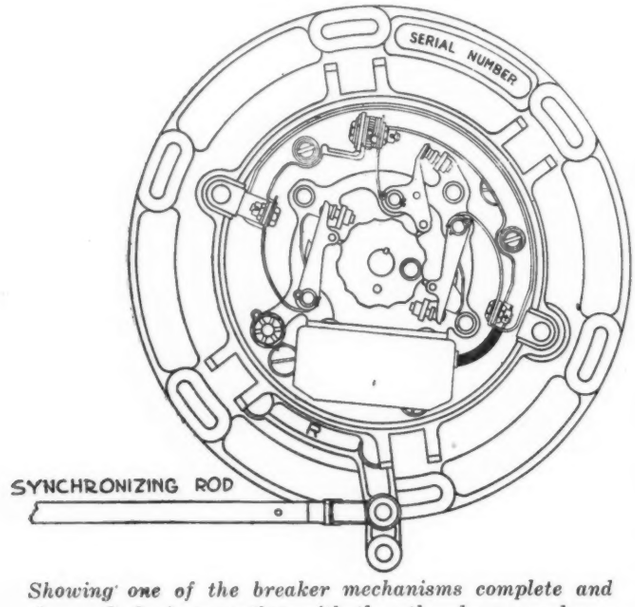
of a special type of storage battery for the ignition. This battery had to be as light as possible and made so that the acid could not be spilt during the various maneuvers of the airplane. The photograph herewith shows the Willard battery that was developed for this purpose. It weighs only 10 lb. 3 oz.

The batteries were supplied by the Willard Storage Co. and the Electric Storage Battery Co. of Philadelphia and are assembled in a single unit container made of hard rubber. No individual jars are used in the manufacture of the battery. The plates are about 3 in. sq. and 3/32 in. in thickness. Threaded rubber insulation is used between the plates, the ends of these insulators having thick ribs of hard rubber extending beyond the edges of the plates.

Referring to the cross section through a cell of the battery, a thin, hard rubber baffle plate separates the part of the cell containing the plates from the large compartment into which the electrolyte is free to flow through small holes in the baffle when the battery is in an inverted position. This compartment is of sufficient size to hold all the acid without any leakage out of the vent hole, either when the battery is laid on its side or when it is in an inverted position. A deep, hard rubber cover and a specially designed vent plug complete the cell. Long, cylindrical posts of lead, burned to a lead insert in the top cover, serve to connect the plates with the top connectors and terminals of the battery.

The specific gravity of the electrolyte of this type of battery is read by tipping the battery on its side and taking the gravity by means of a hydrometer provided with a bent hard rubber tube, as shown in one of the illustrations. In flushing this battery each cell is filled with distilled water to a depth of 1 in. above the baffle plate. After several minutes the surplus water above the plate is removed with a hydrometer syringe. Charging is effected at a rate of one ampere. A discharge rate of 3 amp. can be maintained for 3 hr. at normal temperatures.

One of the features of this battery is the possibility of preparing it for overseas shipment in a "bone dry" condition. A battery prepared in this manner has never had any acid in the cells and can be kept in this condition for an indefinite period. When it is wanted for service the battery is filled with acid of a certain gravity and charged at a low rate until the specific gravity of the electrolyte and the battery voltage remain constant.



Showing one of the breaker mechanisms complete and the method of connecting with the other by a synchronizing rod

New Hall-Scott Engine

BLOCK tests recently made showed that the new six-cylinder Hall-Scott L-6 aircraft engine is capable of developing 212.6 hp. at 1666 r.p.m. A comparison of the results with those obtained from earlier Hall-Scott models, the A-5a and the A-5, shows a considerable improvement. The output figures above given are the average for a six-hour non-stop run which was conducted under the supervision of George R. Ross, a Government inspector. The cylinder dimensions are 5 x 7 in.

One of the chief improvements in this new engine as compared with earlier models is that now all of the oil is retained within the engine, with the result that the oil consumption is only 0.01 lb. per b.-hp.-h. as compared with 0.35 lb. per b.-hp.-h. in the former models. The new engine weighs only 502 lb. as compared with 595 lb. for the type A-5a, which developed less horsepower. Most of the reduction in weight was made possible by the use of steel cylinders, which are similar to those of the Liberty engine, where cast-iron cylinders were formerly used. The greater strength of the steel cylinders permitted of the use of higher compression. The test showed the fuel consumption to be at the rate of 0.55 lb. per brake hp. hr.

Organization of the French Army Automobile Service

Equipment Included 90,000 Trucks and 150,000 Men — Subsidy Plan Made Vehicles Quickly Available—How Repairs Were Handled

By W. F. Bradley

OFFICIAL figures released by the French Government show that the automobile service of the French army comprised 150,000 men and 2500 officers, with 90,000 trucks and cars when the war ended. The value of the automobiles, together with the stocks of spare parts, is estimated at $800,000,000. The budget for the maintenance only of this material is $40,000,000 per month, while if the purchase of new vehicles is included the total expenditure is $600,000,000 per month.

The French have always maintained a bigger army automobile service than that of any of the Allies or of the enemy powers. This was both a matter of policy and of necessity. Whereas the German army specialized more on railroads, the French authorities believed that the best results could be obtained from motor trucks. The great length of line held by the French army compared with the length of the other Allies necessitated the big number of trucks. Also the fact that for a long time the French were on the outside of the circle, with few convenient railroads for moving troops and supplies, had its influence on the number of trucks required.

The French have always maintained a bigger army automobile service than that of any of the Allies or of the enemy powers.

On the outbreak of the war the French did not possess more than 7000 subsidized trucks.

It was under the military subsidy system that the French took over at a moment's notice the whole of the 900 buses in service in the streets of Paris.

Army sections included 20 trucks with two drivers for each, simple repair facilities and a rolling kitchen.

The tonnage transported by automobile during the Verdun battle and during the first Somme battle averaged 766,000 a month.

On the outbreak of war the French army did not possess more than 7000 subsidized trucks. These were vehicles of an approved type in the hands of private owners, but which could be and were claimed by the army at a moment's notice. In addition to these trucks there were between 70,000 and 80,000 privately owned touring cars of a suitable size and power for military service, which the army also had the right to requisition.

Sound System of Organization

A very sound system of military automobile organization had been drawn up before the war, and by means of subsidies manufacturers had been directed toward the production of a type of truck very suitable for service in the field. But although the system was good the quantity of vehicles available was altogether insufficient.

It was under this military subsidy system that the French army took over at a moment's notice the whole of the 900 motor buses in service in the streets of Paris. Some of these buses carried the 75th Infantry Regiment into Belgium, allowing these troops to keep pace with the cavalry. Other buses had their seats ripped out and were transformed in a few hours into meat trucks. By reason of these advance arrangements the French army was able to have deliveries of fresh meat by automobile from the very beginning of the war, this work being done in a very efficient manner.

The system adopted before the war, and which has been in operation until the present date with practically no changes, was to form sections of 20 trucks, with 2 drivers to each truck, simple repair facilities, and a rolling kitchen. Such a section was in charge of a lieutenant, who had the use of either a motorcycle or a light car. Three such sections were united from an administrative standpoint (although not always working together) into a group, and the groups were united into a groupment, each with a carrying capacity of 6 battalions or 1 brigade or 1000 to 12,000 tons of material.

These automobile groups got into actual work on Aug. 10, 1914, and by the end of the month had carried 14,000 men and transported 18,000 tons of supplies.

It was immediately after the Battle of the Marne, when Gallieni requisitioned all the taxicabs and many of the private automobiles of Paris to carry a fresh division to Meaux, that the automobile service began to extend. As an example of the increase, the tonnage transported by automobile during the Verdun battle and also during the first Somme battle averaged 766,000 a month. In June, 1918, when the Germans were making their last supreme effort to crush the Allied armies and gain possession of Paris the automobile tonnage for the month attained the record figure of 1,100,000. It has to be remembered also that the distance covered in June, 1918, was very much greater than during the Verdun battle.

Duties of the Service

Summarized, the duty of the automobile service is to keep the army adequately supplied with men, with food, with munitions and materials, to fill the gaps in the railroad system and permit of the greatest flexibility of movement of the army and its material.

The French system is to have one automobile service for the entire army, and to adopt non-specialization of

vehicles as far as possible. The exceptions are for the Air Service and the Artillery. The automobile service of the army purchases and delivers automobile chassis to the Air Service, but is not responsible from that point on.

The Air Service purchases or builds its own bodies and maintains and operates its own vehicles. It also purchases or builds its own trailers and special vehicles. A somewhat similar state of affairs exists with regard to the artillery; the automobile service has to supply the artillery with shells, food, etc., in just the same way as it supplies the infantry, the engineers and other corps, but it has no control over the tractors and trucks used permanently by the artillery service.

Operated Under Difficulties

The difficulties of the work of the automobile service increased with the length of the war. In 1915 an attack was always preceded by a bombardment of several days. Thus the automobile service was warned that a call was about to be made on it, and all arrangements could be made to so organize the convoys that they could carry supplies and reserve troops to the point where they would be needed.

This was a weakness quickly noticed by the attacking party, and in 1918 long bombardments were no longer indulged in by the German armies. In the big attack on the Aisne, in the spring of 1918, the German bombardment lasted only three hours, and when the Kaiser's troops made their huge Paris drive in July, 1918, the bombardment which preceded the great infantry attack began at midnight and ended at 4.30 o'clock in the morning.

Under such conditions there was no time to concentrate automobile trucks or to bring up reserve supplies by road in time to stem the first fierce rush. This also meant that the automobile men who were in the attacked zone were put to as severe a strain as any of the combatant troops. They had to work until they dropped from sheer exhaustion; whatever food they got was snatched while driving or while waiting for instructions, and all of their work had to be done over a zone which it was in the interests of the enemy to maintain under the most intense artillery fire.

It was not an uncommon thing, under such circumstances, for men to fall asleep at the wheel and to be awakened by the loaded truck running off the road. Cases are not unknown where a tired driver, bringing back war-worn men, has run off the road in the dark, allowing his truck to fall six feet, and both the men in the truck and the driver have continued to sleep until morning.

Considerable Economy Effected

Non-specialization of vehicles and the rigid rule that no officer or unit shall claim a car as his or its property have resulted in a considerable economy in automobiles. A French infantry division, for instance, is entitled to six touring cars and one or two light cars for headquarters use, according to whether the division is composed of three or four regiments.

No unit in the division can claim priority in the use of these cars: they are to be used for the general work of the division. By means of this grouping the six cars are sufficient, and are kept constantly in service, covering from 650 to 700 miles a month. Without this system three times the number of cars would be necessary, and the average car mileage would not exceed 250 per month.

Although France possesses a wonderfully fine automobile service it is not above criticism, and its most merciless critics are the French themselves. The three points which appear to be the weakest are the lack of continuity in general control; the lack of technical knowledge on the part of the higher officials, and, in consequence of this, the faulty system of allowing important repairshops to be established too near the lines.

Authority Changed Five Times

The controlling authority of the French automobile service has been changed five times during the war, the fifth system of management being practically the same as the first. At the present time the automobile service is a sub-division of the artillery, the head of the service being an artillery officer, Lieutenant-Colonel Pujo.

There are four different controlling forces in the French automobile service: (1) A sub-director for the artillery personnel; (2) a director for the material supplied by the Ministry of Armament; (3) a director for imrovements attached to the Ministry of Armaments; (4) a director at General Headquarters for the automobile service at the front.

These four directors are responsible to three different chiefs: (1) The Minister of War; (2) the Minister of Armaments, and (3) General Headquarters. The Minister of War is responsible for the personnel, the Minister of Armaments for the material, and G. H. Q. for operations at the front.

The reformists claim that as the automobile service of the army is only a huge transportation organization, it should be established on commercial lines, with a single director at the front, where the vehicles are used, and a single director at the rear whose functions would be to supply, maintain and improve material, to recruit and train personnel. This director should be responsible to the Minister of War only, and should not be attached to any particular branch of the army. There is no more reason for him to be attached to the artillery than to the infantry, the cavalry, the engineers, or any other corps.

The Plan of Organization

As in the case of the railroads, the General in Chief has charge of all the automobiles operating in the zone of advance. General Headquarters has always maintained that repair parks must be kept in the zone of advance in order to assure proper repair of vehicles in service. Experience has shown that repair work in the zone of advance should be reduced to a minimum and should be nothing more than is essential to keep the vehicles in running order. From simple repairshops there have grown up in the zone of advance very complete overhaul shops employing 600 men, capable of doing elaborate work, and only removable at the cost of considerable time and money.

This system of allowing overhaul shops to be established near the lines has cost the French dear on more than one occasion. This year, when the Germans were making their drive on Paris, they captured one of these repair parks at Noyon practically intact. The officer in command of the organization, feeling nervous at the rapid advance of the enemy, proceeded to G. H. Q. to ask permission to remove. In the meantime the German army advanced. Before the officer had returned with his instructions, and while the German forces were only 2000 yards away, the entire personnel decided that the only thing left to do was to bolt, which they did, leaving the entire repair park, valued at $1,600,000, to be captured by the enemy.

During this German drive there was a similar case at Vierzy. On the approach of the enemy it was impossible to remove the whole park, and material to the

value of $500,000 had to be abandoned. When the Germans began their offensive of March 21 the automobile repair park at La Motte Breuil was considered to be in danger and was ordered to be removed. It went back a few miles to La Ferté sous Jouarre, and had only just begun to get into working order again when the German offensive of May 21 was launched and a further removal had to be made to Montereau. During these removals a complete month was lost.

If the zone of advance had been limited to simple, mobile repairshops, with the overhaul shops entirely in the zone of the rear, better service would have been obtained, and losses which are declared to run as high as $3,000,000 would have been avoided.

Some critics maintain that in addition to this direct loss there was an additional loss of $6,000,000, representing 1000 trucks at $6,000 each, these having to be purchased to replace losses to the enemy or to meet the shortage by reason of the impossibility of carrying out repairs.

This expenditure of $9,000,000 would have been avoided by the adoption of the general rule that all automobile overhauling should be carried out in permanent shops in the zone of the rear. It is stated that the overhaul shops at the front employ 1000 men per day to repair 3.4 trucks per day. At the permanent shops at Orleans 150 men overhaul 11 trucks per day.

Before the end of the war it was fully recognized that the overhaul work, equipped to carry out any kind of mechanical work, also to repair and build bodies, should not be under the control of the G. H. Q. and established in the zone of advance, but should be placed in the interior zone and operated on commercial lines. It was owing to the difficulty of making this change while the war was in progress that these overhaul parks were allowed to remain under the control of G. H. Q.

Very severe criticism has been leveled in France against the system which allowed non-technical men to occupy important positions in the automobile service. This defect is not limited to France, for in all the Allied armies there appears to have been a general idea that any officer, no matter what his previous training, was capable of serving in the automobile service.

The system of judging results by numbers only, inaugurated by non-technical chiefs, has tended to develop abuses. In some parks it was the rule that only the work for which a car was brought in should be carried out.

Thus if an automobile was brought in with a broken spring, the workman would repair the springs; but if he noticed that the steering gear was also defective he would pay no attention to this.

A few days later the car would be brought back to have its steering gear attended to, and the shop would receive credit for two automobiles repaired instead of one.

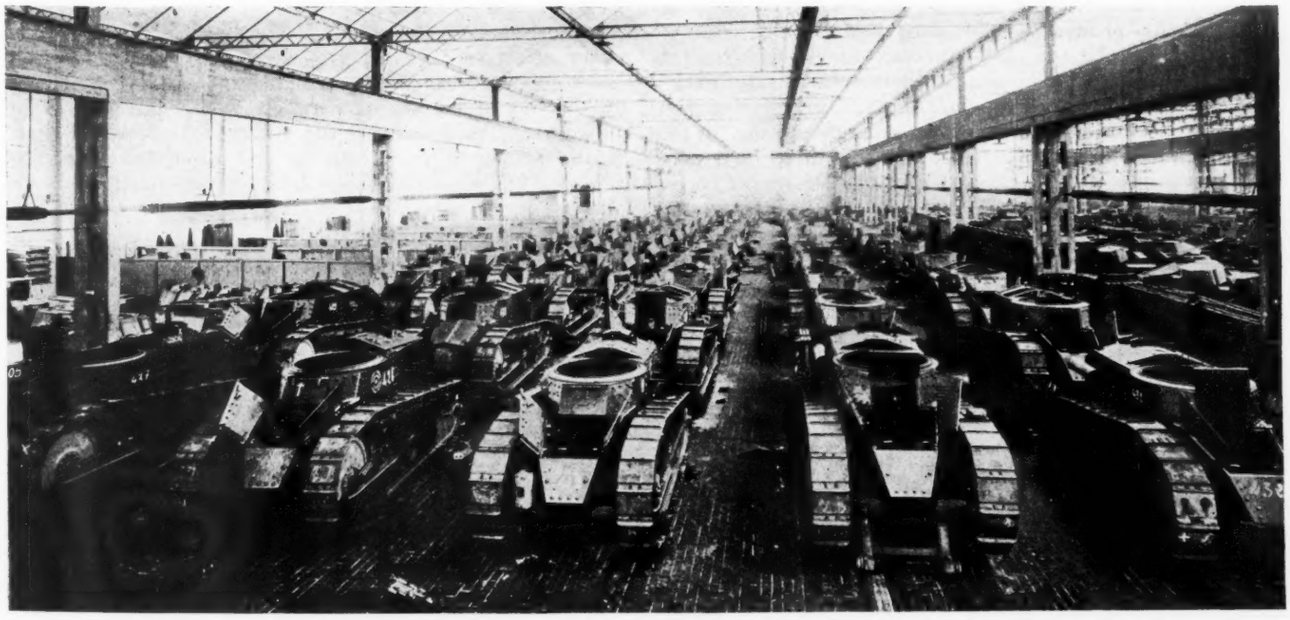
As an extreme case it is stated that on one occasion an officer drove into a repair park in order to pay a visit to the commanding officer. On leaving an obliging mechanic cranked the motor, and then reported this as one car having gone through the shops for repairs.

Repairs at Front Not Satisfactory

The installation of the repair parks at the front has not always been satisfactory. If the officer had had technical training he did good work; if his only idea was to respect military regulations the result was bad. An officer instructed to establish a repair park in a certain locality reported that no suitable building existed there. He was told that he had received his orders and had no right to search elsewhere.

A chief of a repairshop wishing to secure better protection during the winter proposed to build woodsheds covered with tarred paper, the cost of which was 40 cents a yard. The reply of his chief was that the cost was much too high and that in consequence he should use corrugated iron. The officer pointed out that corrugated iron cost much more than wood. "No it does not," replied the chief; "the engineers supply us with corrugated iron, but we have to buy wood."

There was not sufficient technical control over the officers in charge of repair parks.



Assembly building at the Renault plant where small "tanks" were built at the rate of 650 per month for the French and American armies. Seventy are seen in course of assembly. In the same building caterpillar gun platforms and 6-in. cannon were also assembled. This plant employed 26,000 men and is completely equipped with American machine tools

Artillery Tractor Production Well Started When the War Ended

3527 Completed to Nov. 1 and 1174 Shipped to France—Program Included All Sizes from 2-Ton Ford to 35-Ton Mark VIII Machines

WASHINGTON, Dec. 20—At the time the armistice was signed the War Department was preparing to place under General Pershing the finest motorized artillery equipment that has ever been devised.

Tractors and tanks were being shipped abroad in quantities and were entering quantity production in the American factories. A complete program arranged by the Ordnance Department had been designed and put into action.

It included tractors ranging from 2½ to 20 tons, and tanks of various sizes from the 2-Ford to the Mark VIII.

The work of designing and getting these tanks and tractors into operation is chiefly that of two automobile men—Lieut. Col. H. W. Alden, who designed the tanks, and Lieut. Col. W. G. Wall, in charge of tractors and gun mount designs.

The program included the 2½-ton tractor equipped with a Cadillac 8-cylinder engine, capable of hauling the French 75 mm. at 18 m. p. h., the 5-ton tractor equipped with a modified Liberty truck engine capable of hauling a 4.7 howitzer at better than 7 m. p. h., and the 10-ton tractor with a special engine designed by the Ordnance Department, and the 20-ton tractor which is a machine produced by the Holt company of Peoria, Ill.

Mark VIII the Largest Type

The tank program included a 2-man tank equipped with 2 Ford engines, a 6-ton tank fashioned after the French Renault and equipped with a Buda engine, and the Mark VIII tank, capable of carrying twelve men, four machine guns and two 6-pounders weighing 35 tons and equipped with a Liberty engine. In addition a cargo carrier was designed with a truck body and crawl treads.

Production on November 11 of these tractors and tanks had reached a point where the 2½-ton machines were just coming through, and 1858 of the 5-ton, 1541 of the 10-ton and 128 of the 20-ton types had been produced. Of these, 450 5-ton, 643 10-ton and 81 20-ton types had been delivered in France.

The production on the Ford tanks would have totalled 1250 for the month of December and the Ford plants would have had a production of 2500 a month for January 1.

The 20-ton tank, one of the engineering marvels of the war, was exhibited yesterday at the Aberdine Proving Grounds. Assistant Secretary of War Benedict Crowell drove it over bushes and trees up to 17 in. in diameter and across the stumps.

This particular tank exhibited carried an 8-in. howitzer gun. It weighed 55,000 lb. It had made a journey overland from Peoria to Detroit and from Detroit to the Aberdine Proving Grounds at Maryland, and included among its feats the climb of a 45-degree grade and traveling through 4 ft. of water.

In its journeys overland, whenever a bridge was reached which was considered dangerous, the tank was forded across the river at some shallow point.

A demonstration was made which included the firing of a gun with the engine running. The shooting did not disturb the engine, in fact did not even cause a miss, and as quickly as the shell was discharged the tractor was gotten under way.

2½-Ton Machine Wins Race

The cargo carrier with a truck body and a tractor tread was designed for hauling heavy tonnage. It has all the qualities of the other tractors and is able to climb grades, but of course has not the ability to push down trees. The Mark VIII tank, which is equipped with a wireless outfit, was produced by the Ordnance Department on a joint production schedule with England, parts being made here and shipped abroad for assembly.

The 2½-ton, 5-ton and 10-ton tractors were manufactured at various automobile plants. A race between these tractors and including the Ford tank, resulted in a victory for the 2½-ton machine, which easily outdistanced the others at its speed of 18 m. p. h., but the 5-ton job, which includes the modified Liberty truck engine and which has been described before in these columns, was said by the officials to undoubtedly be the best artillery tractor that has been produced.

The Ford job is more or less freakish, but nevertheless very effective. The entire tank is less than 6 ft. high and about 10 ft. long. Entrance is made by lifting up the front metal shield through which the gun muzzle appears. The space for the two men is so small that it is necessary to back into it, and when the driver and gunner are seated they are huddled in so compactly that there is not even room to sway with the turning and jarring of the tank.

The gunner has his only view by peering through the muzzle of the gun. The driver sees only through the slits in the tower of the machine, and between severe jolts received over the ground and the spasmodic jerks resulting with every turn of the tank, the occupants have a difficult time. The tank operates at 15 m. p. h. and when turning, instead of describing an arc makes an abrupt right about or left about, which makes riding in the tank very difficult and uncomfortable.

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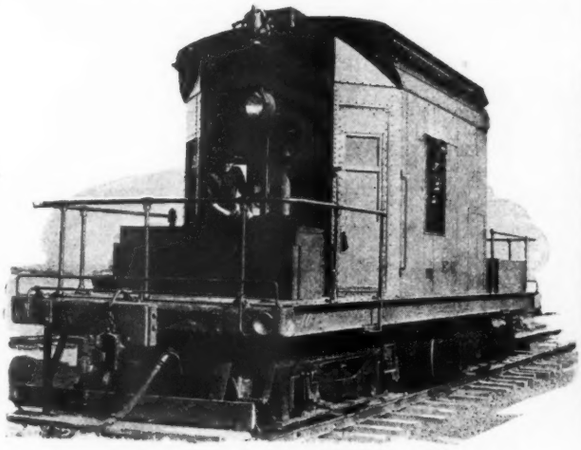
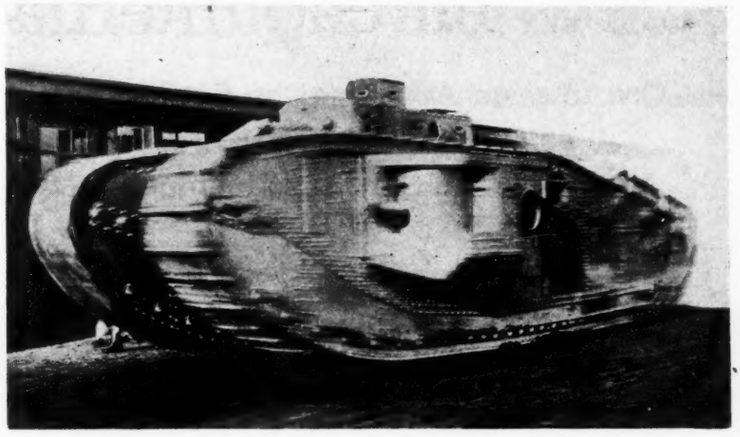
A FRENCH report on new anti-friction metals includes trials of alloys consisting chiefly of aluminum, cadmium, magnesium and especially of zinc. Such alloys were designed to reduce as far as possible the use of copper, tin, lead and antimony, and the most satisfactory results are stated to have been given by a compound of 63.3 per cent of zinc, 21.3 per cent of tin, 12 per cent of lead, and 3.3 per cent of copper.

Some of America's Land Battleships

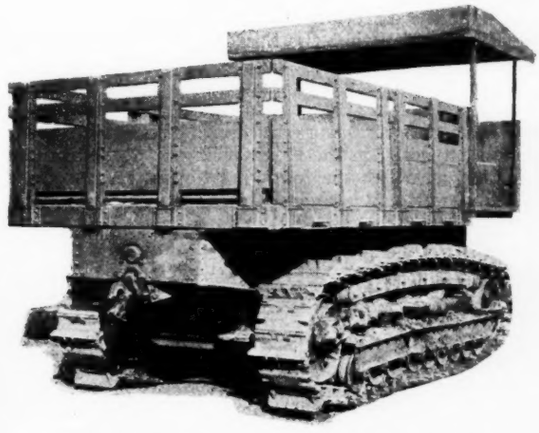


Type of gasoline-propelled railroad engine which has been developed for use in and around cantonments

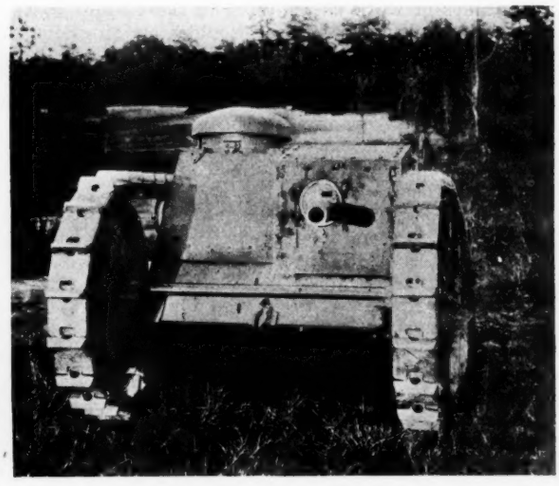


The Mark VIII Tank, produced by the Ordnance Department on a joint production schedule with England, carries twelve men, four machine guns and two six-pounders. A twelve-cylinder Liberty engine, the same as used in airplanes, furnishes the power for this 35-ton dreadnought. A wireless outfit by which communication is always had with headquarters is a part of its equipment

Crawler type of heavy howitzer conveyor which is capable of going practically anywhere, even through heavy brush and forest



Another use of the crawler type of transmission, this time on a stake-body vehicle for carrying ammunition and supplies



Machine gun cavalry is the name that should properly have been assigned for these American "Baby" or 3-ton tanks, developed by the Engineering Division of the Ordnance Department. Capable of a speed double that of a horse and with one man firing at a rate in excess of the firing of ten men with rifles, this type of tank saves the work and lives of many thousand soldiers. It advances against machine gun fire, and can pull guns as well as carry fighters

Screw Thread International Standards

Commission Appointed by Congress Beginning Active Work—Results of Questionnaire on U. S. Standard, S. A. E. Standard and A. S. M. E. Machine Screw Standard Threads

ON Sept. 21 last Secretary of Commerce Redfield appointed a Commission for the Standardization of Screw Threads in accordance with an act of Congress known as House Bill No. 10852. This committee was later divided into four branches, to deal respectively with (1) pitches, systems, forms of thread; (2) tolerances, classification; (3) nomenclature and terminology; (4) gages and methods of test.

The bill referred to prescribes the duties of the Commission, which, it says, shall ascertain and establish standards for screw threads, which shall be submitted to the Secretary of War, the Secretary of the Navy and the Secretary of Commerce for their approval. These standards, when approved, shall be adopted and used in the manufacturing plants under the control of the War and Navy departments and so far as practicable in all specifications for screw threads in proposals for manufactured articles, parts or materials to be used under the direction of these departments. It is also intended by the bill that the Secretary of Commerce shall promulgate such standards for use by the public and publish the same as a public document.

The first hearing for the purpose of obtaining data and views from manufacturers and users of screw-thread products was held on Oct. 7 in the Engineering Societies Building, New York City, at which the following topics were discussed:

1. As a national standard, is there any objection to the continuation of the U. S. Standard system of thread diameters and pitches for general use in practically its present shape?

2. As a national standard, is there any objection to the adoption of the S. A. E. system of diameters and pitches of fine threads?

3. As a national standard, to what extent could the A. S. M. E. system of standard machine screws be adopted?

4. There seems to be a general feeling that in standardization we should make it possible to cover several classes of work, and there has been suggested a minimum of four classes of fits to provide for different grades of work ranging from reasonably wrench-tight fits to very loose fits. Would such a classification, including at least four classes, be sufficient for all grades of work encountered in the various systems of threads previously mentioned or would a classification including more than four classes be required?

5. Is there any objection to adopting the "standard hole" practice for screw threads—that is, the practice of making all the taps for any particular thread of one basic size and securing the required fit by changing the diameter of the screw on male threaded work which is to assemble with the nut cut by the basic tap?

The consensus of opinion of those present was as follows:

1. The U. S. system should be continued practically in its present form for the ordinary threaded work, to which it is well adapted.

Objections were raised to its use for diameters less than ½ in. on the ground that for small work the U. S. pitches are too coarse and the threaded work too much weakened by excessive depth of thread.

2. The S. A. E. system is satisfactory for use where finer threads are necessary, as, for example, in automobile and aeroplane work.

3. The A. S. M. E. machine-screw system should be used to supplement the U. S. system for diameters less than ¼ in., and all sizes from 14 to 30 should be discontinued in order that there may be no overlapping of the two systems. A minority thought that all A. S. M. E. sizes should be retained.

4. Classification of Fits. The general opinion was that four classes of fits would be ample to provide for all ordinary threaded work, and that very probably three classes would be sufficient, since it was felt that wrench fits, stud fits, etc., which could not be covered by general specifications should be classed as "special" and no attempt made to include them in the regular classification.

5. Standard Hole Practice. There was a sharp difference of opinion on the question of whether the nut or the screw should be made basic, with the majority favoring the former.

A part of the objection to making the hole basic arose from a misapprehension. It was suggested that if the tap or the tapped hole were made basic it would be necessary to carry in stock several sizes of bolts in order to provide for different classes of fits. Such, however, is not the case, since in general only a single class of fit will apply to each threaded product, and only that class would be carried in stock. For example, machine screws should be made within certain tolerances, while bolts for agricultural machinery would require larger tolerances, and there would be no necessity for providing for machine-screw fits on agricultural-machinery bolts, or for "agricultural fits" on machine screws.

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Carbon Tool Steels

A NEW line of carbon tool steels is being manufactured by the Carnegie Steel Co. in its electric furnace at the Duquesne Steel Works, in five grades. These five grades contain different proportions of carbon, are suitable for different uses and in manufacture and shipment are designated by appropriate labels of different colors.

Although alloy steels have been generally used for cutting tools of late, the Carnegie Steel Co. reports that in its own machine shops and in actual work in its various plants it has found that there are many purposes where a well-made carbon tool steel can be utilized in the manufacture of tools. It has been possible by the use of carbon steels to reduce the cost of machine and other tools without material loss either in endurance or in speed of operation.

To introduce these new steels the Carnegie company has issued a new publication—Tool Steel. This is addressed to users of tool steels and only essential practical information is given, while extended theoretical discussion of heat treatment and related subjects is avoided. No use is made of the terms "critical temperature" and "critical range," but instead the shop terms "line of hardening" and "minimum grain size" are used.

In standard works of reference on metallography and heat treatment may be found figures illustrating the changes which take place in various kinds of steel under heat treatment. These, however, are, as a rule, steels of different carbon content, alloy steels, etc., so that a direct comparison is not possible. In Tool Steels are given illustrations of Metcalf test pieces and full-size test piece fractures made from specimens treated and tested at the Carnegie shops.

There is also a chart of heat colors, with its corresponding heat treating temperatures, based on carbon steels. Names of colors have been selected to conform to most general uses and are checked by indication of temperature in degrees Centigrade and Fahrenheit.

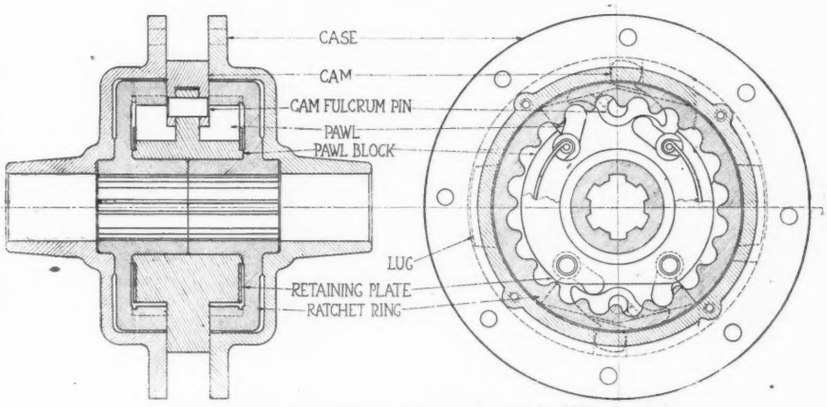
A chart of temper colors is likewise entirely new as regards the form in which it is presented. It is a direct reproduction by color photography from test pieces heat treated to the temperature shown.

The Allen Self-Locking Differential

A Simple Device Embodying the Reversible Ratchet Principle—Drive on Curves Is Entirely Through Inner Wheel—Loss of Traction of One Wheel Cannot Stall Car

A DIFFERENTIAL of the type which drives on the inner wheel only when the vehicle is turning a corner, and which gives positive traction on one wheel, irrespective of the condition of the ground on which the other wheel may be standing, is manufactured by the East Iron & Machine Co., Lima, Ohio, and is to be marketed under the name of the Allen differential.

It comprises a pawl and internal ratchet mechanism, the ratchet device being automatically controlled. Each of the two ratchet wheels is provided with a splined hub which is fitted to one of the axle shafts, and in addition to the wheels there is a spider ring carrying the driving pawls. The pawls are set in the spider ring with limited movement, and the whole is secured to the casing to which the main gear wheel is either bolted or riveted. The driving mechanism, consisting of the ratchet wheels, spider and pawls, is assembled and secured in the casing. The spider ring arms are secured in slots in the casing with a limited movement, 3/16-in., which movement automatically changes the pawls from the position of forward to that of reverse drive. Hence, the backlash of the differential is only 3/16 in., and in operation the device is said to be absolutely noiseless and without shocks.



Longitudinal and cross section through differential

When the mechanism is pulling both wheels, in driving straight ahead, all parts move together as a unit. When one part moves faster, as in rounding corners, there is no load on that member. In rounding corners, the outer wheel overruns the driving pawl, making it a free wheel. The inner wheel then takes care of the entire load. Should the driving wheel encounter slippery surface and lose its traction, the outer wheel will pick up the load until such time as the inner wheel again secures sufficient traction.

When the driving clutch is disengaged, and the engine thereby disconnected from the driving mechanism, the differential automatically reverses and its reverse pawls control the wheels on the momentum drive. A light application of the brakes will then stop the car. When the power is again applied, the differential automatically changes to the position for forward drive. The chief advantage claimed for the Allen differential is that it makes a vehicle practically unstallable.

We understand that this differential has been given extensive tests, both on passenger cars and on 3½-ton trucks.

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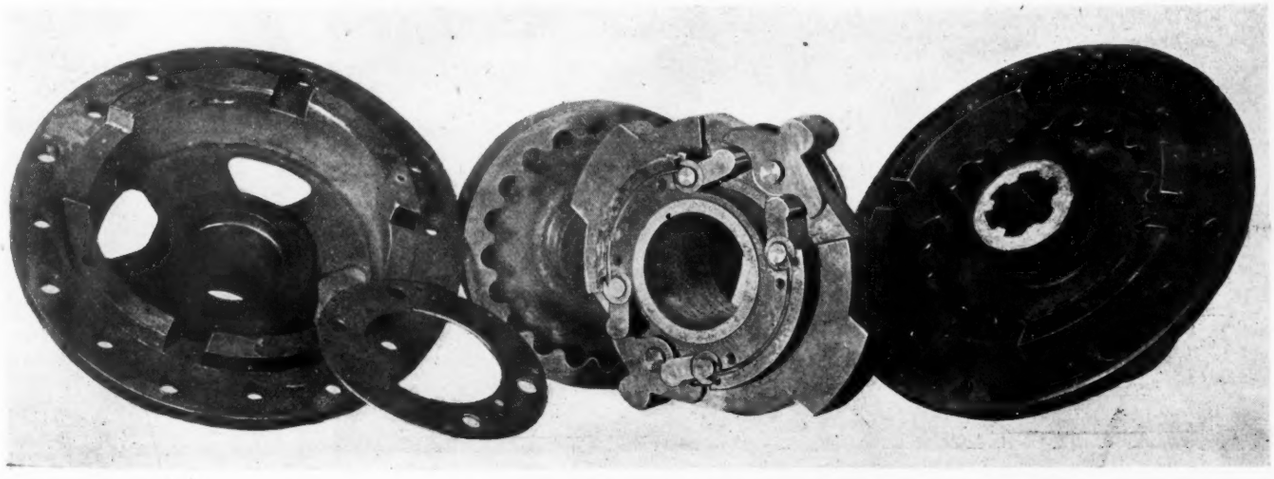
THE predominant contributer to the world's supply of petroleum is the United States, which furnished no less than 64.74 per cent of the estimated total for 1917, the others in order of importance being: Russia, with 13.26 per cent; Mexico, with 11.37 per cent; the Dutch East Indies, with 2.74 per cent; Rumania, with 2.08 per cent; India (Burma and Assam), with 1.61 per cent; Persia, with 1.32 per cent; Galicia, with 0.947 per cent; Japan, with 0.615 per cent; Peru, with 0.511 per cent; Trinidad, with 0.303 per cent; Germany, with 0.189 per cent; the Argentine, with 0.170 per cent; Egypt, with 0.094 per cent; Canada, with 0.037 per cent; Italy, with 0.002 per cent, and other countries, with 0.006 per cent.



Parts of the Allen self-locking differential

Development of the Aircraft Spruce Industry

Douglas Fir Used as Substitute in Less Exacting Work—Figures of Monthly Cut—Woodworking Plants Put to Making Finished Airplane Parts—Byproducts Disposal a Serious Problem

PART II

By Lawrence K. Hodges

OWING to the relatively limited stand of spruce, to the difficulty and expense of increasing production and to the urgent necessity of rapidly expanding supply of airplane lumber, resort has been had to Douglas fir, which now constitutes about half of the cut. Spruce is reserved more particularly for combat and bombing planes, because of its combination of strength with lightness and resiliency and because a bullet cuts a clean hole instead of shattering it. These qualities enable a plane in which it is used to fly higher and carry more weight than one framed of other wood, and to remain in the air after its beams have been punctured with bullets which would have sent other planes to earth with broken wings.

Fir is strong but heavier and is more apt to shatter, but is well adapted for training and reconnoissance planes. Port Orford cedar is also used, being superior to fir, but there is only a small stand in the extreme southwestern corner of Oregon, and the entire output is shipped to the Allies.

The results accomplished in the course of the year that General Disque has been in control are told in some eloquent figures. In August, 1917, shipments totalled 202,264 ft. and in response to the pleas of the Allies an increase to 2,683,329 ft. was accomplished, all of this being spruce. In October, 1917, when cutting of fir stock began, the total was 3,443,667 ft.

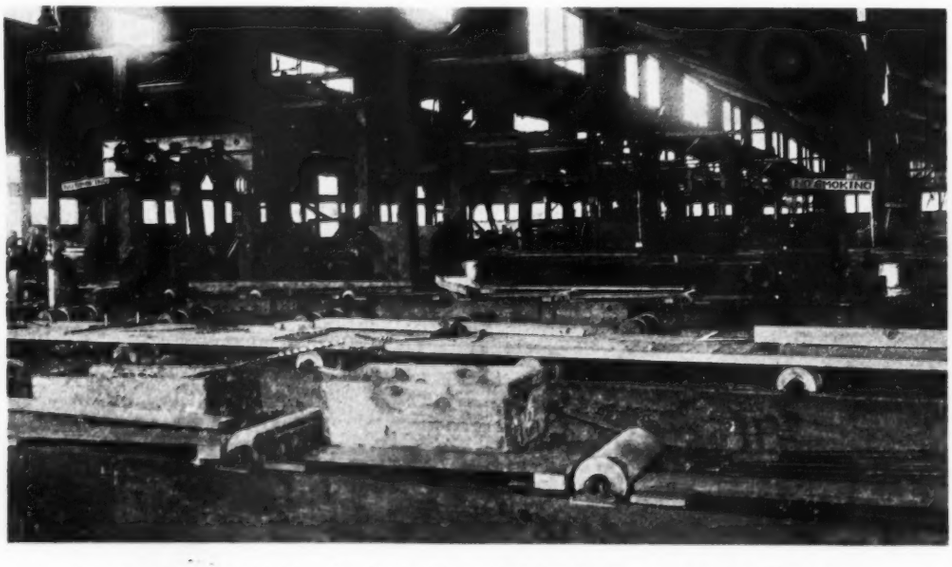
Output increased steadily from month to month and showed a spurt after the Vancouver mill began cutting, until in August, 1918, the total was nearly 18,500,000 ft. and in October almost reached 20,000,000 ft., about equally divided between spruce and fir. In fact, the shipment of good stock increased far more rapidly, for before the cut-up plant was put to work in February the totals were subject to a discount of 90 per cent for rejections, while since that time all stock shipped has been as nearly perfect as it can be made when cut and trimmed to wing-beam size.

Last November the Spruce Division aimed to reach a monthly output of 10,000,000 ft., and this mark was passed in March, but in April, in consequence of the great German offensive, it was raised to 30,000,000 ft. There is good promise that this point will soon be attained as the new mills come to full production. Growing efficiency of the men as they gain skill and experience aids powerfully in swelling output. In August the output at Vancouver was more than double that which was originally planned, and it steadily grows without addition of new units, though with improvements in machinery.

Three Plants for Making Finished Parts

The Government has begun carrying production of airplane lumber on the Pacific Coast still farther by employing three woodworking plants to make finished parts to a tolerance of one thirty-second of an inch, ready for fitting and assembling in the airplane factory. The plants and skilled labor on the Pacific Coast are ample to furnish all the stock produced for the United States, and the depression in building has left them practically unoccupied except in finishing work for ships.

The stock turned out by the cut-up mill is further trimmed,



Interior view of airplane lumber mill erected by the Government at Vancouver, Wash. This huge building was put up in the record time of 45 working days

H. S. MITCHELL

Designer and Manager of Government airplane lumber mill at Vancouver, Wash.

To reach the heart of the timber the Government has built 166 miles of spur track. From these lines plank or corduroy roads branch into small canyons and over them motor trucks haul logs to railroads

and that process reveals defects which cause rejection of 30 to 40 per cent. If this work were done on the Coast, a further reduction of 75 per cent in the tonnage shipped might be effected.

Planing mill men suggest that much material might be saved if wing-beams were built up of thin laminations rather than composed of solid pieces. A single knot or other defect may cause rejection of a beam 20 ft. long, though it may be otherwise sound. By laminations all the sound part of that beam could be used. Also a solid beam may be perfect to all outward appearances, but may have internal defects which would be discovered and eliminated if it were cut into thin laminations.

The layers of wood could be overlapped to give the same strength as is obtained in a solid stick, and added strength would be gained by elimination of defects which would otherwise be hidden. Much lumber which is now rejected would also become available for airplanes.

When it is considered that the present accessible stand of spruce in Oregon and Washington is estimated to yield at the most 700,000,000 ft. of airplane stock and that consumption will soon reach 15,000,000 ft. a month, economy dictates that the proportion made available for aircraft be greatly increased. Aviation in commerce and travel may soon be as general as it now is in war, and without such economy the best airplane lumber may reach an impossible price.

Problem of Side-Cut Lumber

The tremendous impetus given by the war to production of spruce for aircraft has created a serious problem for the lumbermen; that is, how to dispose of the side-cut lumber, meaning the product unsuited for aircraft which must be cut in process of cutting airplane stock. At the Government mills this amounts to 44 per cent of the output, but in commercial mills it is 80 per cent. The sudden increase in production of this class of lumber is indicated by the fact that there are now 52 spruce mills and that 25 of these cut spruce exclusively, as against a total of 25 four years ago which cut one-fourth spruce to three-fourths fir and cedar.

Formerly a market was found for the smaller output in building, boxes and food containers. With an output several times as large, the demand for building is at its lowest ebb, and a tremendous expansion of the market for other uses will be necessary to absorb the growing stock.

Side-cut in immense quantities is piling up at the mills, and it constitutes a financial burden to the manufacturers and to the Spruce Division, as well as an obstruction to their operations.

To cope with this problem, General Disque has established a sales department and has placed in charge Lieutenant Thor W. Sanborn of Kansas City, who has been selling West Coast lumber for sixteen years and has made spruce his specialty.

He has divided all the country east of the Missouri River into districts, each of which is in charge of a trained salesman and is supplied with a stock at its commercial center, from which prompt delivery can be made.

A planing mill has been added to the Vancouver plant to finish side-cut. A Spruce Bureau has also been established by the West Coast Lumbermen's Association with Ralph C. Angell as manager, and he works in co-operation with Lieutenant Sanborn. They are urging the Government to use spruce in some of the vast number of packing cases which it uses for supplies, and the suggestion has been made that boxes and crates for airplanes alone would consume 300,000,000 ft. a year as long as the war lasted.

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Raybestos Molded Disc Clutch Facing

THE Raybestos Co., Bridgeport, Conn., has recently announced a new type of facing for disc clutches, known as the Raybestos molded disc clutch facing. It is composed of pure asbestos with a suitable binder, molded under great pressure. This process of manufacture is said to insure a homogeneity and an accuracy impossible with the woven type of facing, which was composed of asbestos spun around a composition wire (the wire to give the required tensile strength), this in turn being woven into tape, which was subsequently formed into a ring.

Discs of this molded facing can be made endless, which was impracticable with the woven facings. Owing to the homogeneity of the facing its frictional properties do not change as it wears away.

Among the claims made for the new facing are the following: It presents approximately 20 per cent more surface to the steel disc, consequently it increases the capacity of a clutch of given dimensions. It permits of a clutch easy in action, positive in release and free from sticking. The friction coefficient is given as between 0.35 and 0.40.

Raybestos molded disc clutch facings

Pickling with Nitre Cake

Permits of an Appreciable Economy in Steel Cleaning and Reduces Demand for Technical Sulphuric Acid

AN investigation has been made by the Bureau of Mines regarding the availability of nitre cake for pickling steel. At the present time sulphuric acid is used for the purpose but the acid present in the thousands of tons of nitre cake produced in the manufacture of nitric acid for explosives might be utilized to the extent of releasing an equivalent amount of technical acid from industries which might find it economically practicable to adapt their processes to the use of a substitute. The nitre cake which is left to weather in the open, soaking into the land and polluting the streams, is a source of manufacturing nuisance, as well as an economic waste, the correction of which would partially relieve the strain on sulphur and acid production.

Nature of Nitre Cake

Nitre cake is, popularly, a mixture of neutral sodium sulphate with a varying proportion of sulphuric acid; more properly, it is an impure acid sulphate or bisulphate of soda carrying a variable excess of sodium sulphate or, infrequently, of sulphuric acid, from kettles improperly charged or prematurely drawn. Sodium bisulphate contains, chemically, 40.6 per cent sulphuric acid combined with 59.4 per cent sodium sulphate in the double salt of the formula NaH_3SO_4. Nitre cake may occasionally have the same approximate composition, but its acidity usually ranges between 28 per cent and 44 per cent sulphuric acid, depending on the working conditions surrounding its production. In addition to the substances already mentioned, the cake contains small percentages of iron, aluminum and silica as regular impurities, with traces of arsenic, sodium nitrate or nitric acid as accidental impurities. The following analysis is fairly typical of its composition:

Silica	0.10 per cent
Oxides of Iron and Aluminum	.45 " "
Free Acidity, H_2SO_4	34.55 " "
Sodium nitrate	.05 " "
Sodium sulphate	64.75 " "
Sulphates of Calcium and Magnesium	Trace

Nitre cake is, then, an indefinite chemical compound which, like sodium bisulphate, or acid sulphate, breaks up in solution into sodium sulphate and free sulphuric acid, entirely available as such for metal cleaning. Thus the pickling capacity of one pound of the nitre cake whose analysis is cited above is equivalent to 0.37 lb. 66 deg. Be. (93.2 per cent) sulphuric acid, or to 0.44 lb. 60 deg. Be. (78.04 per cent) sulphuric acid.

Method of Use

Cleaning with nitre cake solution does not differ essentially from pickling with acid, but it introduces certain necessary manipulative changes due to the presence of sodium sulphate in large proportion as a diluent. Sodium sulphate in hot concentrated solution tends to reduce the activity of the acid; as a result, pickling with nitre cake alone of approximately 33.3 per cent acidity, requires from 1½ to 2¼ times the period demanded by acid under similar conditions. The reaction velocity of the solution of nitre cake of acidity 41 per cent is at least twice as great as the solution of a cake of 32 per cent acidity at the same temperature and concentration. Hence, a mixture of three parts of nitre cake with one part of 60 deg. acid, or four parts of nitre cake with one part of 66 deg. acid should serve to maintain normal production and at the same time effect a saving of acid. In some processes it has been found practicable after a few experimental runs to substitute acid entirely with nitre cake; the time element involved in experiment and operation, however, forbids entire substitution in most work.

In most works operating with nitre cake solution the bath is made up with nitre cake and acid sufficient to give the desired strength for pickling (2-10 per cent free H_2SO_4, reckoning the acidity as H_2SO_4 vs. water, rather than H_2SO_4 vs. weight of solution); successive additions of nitre cake and acid are made during the day as deterioration of strength demands until the density of the hot solution approaches specific gravity 1.26-1.28. "Killing down" is then begun; the temperature of the solution is raised to 200-205 deg. Fahr. and maintained until analysis shows an acidity of 0.002-0.004 gm. H_2SO_4 per c.c.

Occasionally it is found practicable, through normal interruptions of operation, to let settle the particles of scale and other extraneous matter suspended in the bath, to draw off five or six inches of "sludge" from the bottom of the tank and replace with an equal volume of water and nitre cake.

Supplementary Tank System

By the installation of a supplementary system for continuous operation in conjunction with the pickling the settling may be even more comprehensively effected. Such a system involves the use of two extra tanks separate from the actual pickling vats. The initial cost of installation is moderate, the cost of maintenance small.

The first of the supplementary tanks serves partly as a pass tank, into which the partially spent pickle solution may be dropped by gravity prior to being raised by steam-injector, air-lift, or compressed air to the main settling tank. The latter, in turn, is placed on a higher level than the main pickle tank, to permit again of gravity flow from the upper levels, gage-controlled, back to the working tank.

The first, or pass-tank, may, by the introduction of the necessary steam coils and proper ventilation, be used as a dissolving or fortifying tank. Here the acid or nitre cake is run in and dissolved to the necessary amount, and the solution then raised to the main settling tank, in which dirt and suspended rust and scale are deposited and at intervals drawn off at the bottom with such sulphate crystals as may separate as the liquor cools. In this way scale and crystals may be recovered, the solution cleaned, and its gravity and consequent viscosity reduced, while the acidity may be maintained at a practically constant value.

A system of this general type is by far the most economical for handling pickle liquors. Reasonable care in its operation tends to eliminate losses of small percentages of acid which are ordinarily run to the sewer; to minimize the spotting of material resulting from the red oxide deposits carried out of dirty solutions and which are often with difficulty rinsed off in the wash tanks; and to give a mobile cleaning solution at all times of uniform acidity and free from suspended undissolved salts.

The process necessitates no interruptions; it provides a continuous cycle of operations in which the dissolving of pickling agent, cooling, crystallizing and settling are permitted a sufficiently long interval in which to keep up with pickling, provided a fair reserve of solution is kept in circulation in the liquor storage. Solutions may be rejected and renewed without interfering with the cycle.

The system is applicable to both hand and machine, as well as plunger, pickling—especially to those processes of pickling heavy stock in which it is not uncommon practice to run the solution to the sewer as soon as the material is cleaned without making a determination of spent acid and regardless of

the waste which is entailed in such summary starting of the tank plugs.

With proper chemical supervision the crystallization in the settling tank may be so controlled as to yield, from the stronger solutions, a good technical grade of ferrous sulphate.

Modifying Agents

The pickling solution of nitre cake and acid may be still further modified by the addition of other substances in small quantities to produce specific effects. Thus, a fraction of a per cent of an organic body, such as spent tan-bark, quebracho fibre, waste sulphite liquor from the extraction of pulp-wood chips, or of one of the various non-fumes or no-gas compounds on the market, serves to blanket such acid fumes as may be carried out by the steam, and at the same time assists in removing oil or grease deposits from the metal. Again, calcium fluoride helps to slough off particles of furnace bottom which sulphuric acid only with difficulty affects. Finally, sodium chloride added to the cleaning solution accelerates attack on alloy scales, particularly those containing nickel and tungsten; while nitrate of soda is apparently without beneficial action; the presence of free nitric acid causes pitting of low carbon steels, notably in the case of metal for wire and tubes.

Summary and Extension

1. From ten to twenty per cent economy may be effected in steel cleaning by (a) suitable temperature regulation designed to check fume loss as well as steam and fuel waste; (b) the use of polarizers or inhibitors adequate to minimize dissolving of sound metal and to blanket entrainment of acid in vapors rising from the surface of the bath; (c) methodical chemical and mechanical control maintained to prevent live steam losses at worn fittings and acid waste in splashing, leaky equipment, and in spent solutions rejected before the acidity has dropped to a specified limit of 0.3-0.5 per cent or less.

2. Except in the cases of a few special processes, nitre cake may be substituted for 50 per cent of the acid now used for steel pickling. In those industries where time is not the controlling consideration the substitution may after trial be made even entire. The maintenance of production and the lining up of co-ordinate operations demand with present equipment, however, the use of acid to accelerate the action of the nitre cake solution; otherwise total substitution requires a 30-50 per cent increase of tank equipment.

The exceptional instances in which the adoption of nitre cake pickling tends to introduce disproportionate hardship include (a) highly polished hard steel wire and drill rod; (b) butt-welded tubing for enameled conduit, the interior of which must be energetically pickled with a readily mobile, rapidly circulating acid solution for the removal of siliceous furnace bottom without undue reduction of the exterior wall; (c) the finer grades of tin-plate; and (d) those processes and plants in which the spent pickle liquor is concentrated for copperas recovery.

Sand-castings should be cleaned with a mixture of sulphuric and hydrofluoric acids. High nickel-chrome and tungsten-vanadium-chrome alloy rod and wire are best pickled in mixed hydrochloric-sulphuric acid, or with sulphuric acid in conjunction with common salt.

3. The chief objection to the use of nitre cake in the cleaning of tin plate and sheet stock appears to rest on a physical or mechanical problem. The cake is ordinarily added to the machine tanks in lumps, which, dissolving irregularly, lead to momentary irregularities of acid concentration and consequent burning of the sheet; or, added as a powder or ground cake at the surface of the bath, it deposits on the sheet and causes local pitting or smudging which appears on the finished material as pinholes or blisters. The preparation of clear solutions would seem to be the proper corrective of these faults.

4. The shipping and handling of nitre cake demands special cars and storage and an increase of transportation tonnage over that required for the equivalent acid. The increase of labor for handling is an essential item, though not a serious one except where extreme labor shortage obtains. Control of operation at the pickle tanks requires certain alterations of process of handling which the majority of plants are prepared to make.

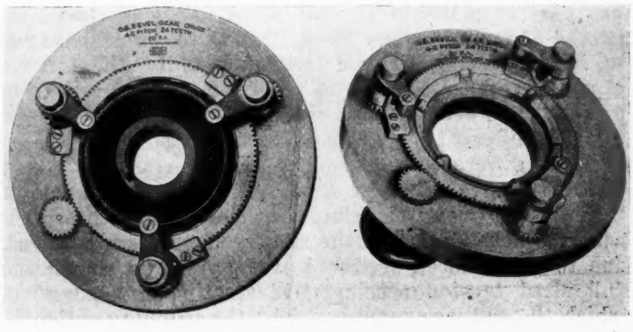
5. The exploitation of nitre cake as a commercial material has been only too frequently accompanied by enthusiastic but extravagant assertion of its effectiveness as cure for all the ills incident to pickling. Unquestionably it produces in most work a better metal surface than does acid alone; it reduces the fume nuisance; effects a saving of metal and acid; and aids in the utilization of a valuable technical product whose rejection at the point of production is a vast economic waste. But it can be regarded as a total substitute for sulphuric acid only under exceptional circumstances; its action is substantially slower than commercial acid solutions, and the labor required to handle it is necessarily greater. Its use as a beneficial substitute demands intelligent experiment until the conditions governing its behavior are understood.

New Lathe Chucks for Spur and Bevel Gears

LATHE or grinding machine chucks designed to permit of chucking spur, bevel and other gears quickly and accurately are being manufactured by the Garrison Machine Works, Dayton, Ohio. The chuck for spur and internal gears and sprocket wheels is known as the Johnson chuck. It is designed for use when it is desired to remachine or regrind the holes in the gears concentric with the pitch diameter. It is claimed that use of these chucks obviates the loss of expensive parts due to questionable chucking methods, lack of judgment or carelessness on the part of the operator. With the Johnson chuck a spur gear can be chucked accurately in four to six seconds. The work is entirely automatic and does not depend upon the skill of the operator. Adjustment of the chuck for a different size of gear requires only two minutes. With one set of chuck members the Johnson chuck holds all gears of a given pitch, and it has no loose parts. The bearings of the chuck are protected against emery or grinding solution. The chuck can be applied to any grinder, the same as an ordinary chuck, and it serves also as a gage for the pitch diameter, indicating over a range of 0.030 in. the amount the pitch diameter is out either plus or minus. These chucks are of an outside diameter equal to the pitch diameter of the largest gear to be chucked plus the outside diameter of a 24-tooth gear of the same pitch.

For chucking bevel gears the same company manufactures the O. G. bevel gear chuck. With this bevel gears can be chucked accurately concentric with the pitch diameter, and the operation for a gear of 6 in. pitch diameter requires only 5 sec.

In chucking the gear the clamps are all turned simultaneously into radial positions over the gear and clamped by turning a knob back of the chuck to the right. To unchuck the gear this knob is turned to the left, which automatically loosens all clamps, turns them out of the way of the gear and raises and holds them until another gear is inserted.



Gear in place *Ready to receive gear*

Hair-Line Defects in Crankshafts

Metallographic Study and Physical Tests of Chrome Nickel Steel Crankshafts to Determine Nature and Effect of So-Called Hair-Line Defects

PART II

By Lieut. P. J. Piccirilli

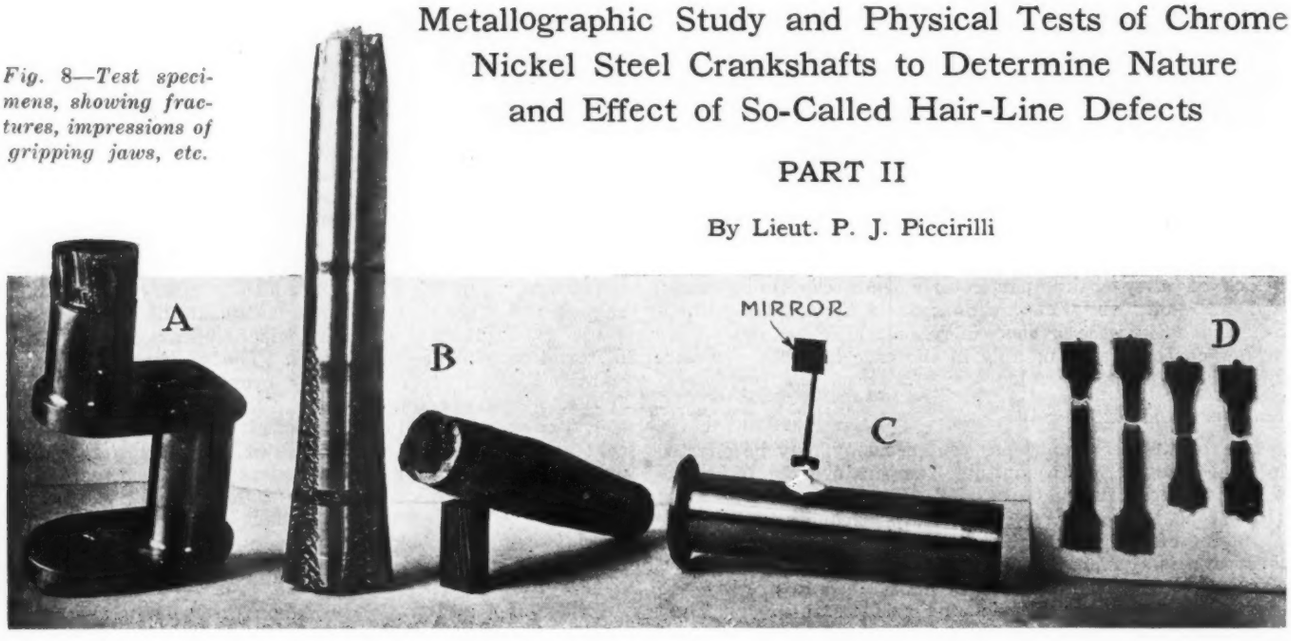


Fig. 8—Test specimens, showing fractures, impressions of gripping jaws, etc.

FOUR tension tests were also made upon small flat specimens of reduced sections, cut from shaft B. Two of these were cut from the cranks, so as to obtain test pieces at right angles to the direction of the fibrous structure of the material, to permit of determining the strength of the material across the grain, with its resultant fracture. These pieces were necessarily short, so that it was possible to obtain only the yield point and not the true elastic limit. The result of the two tests made give average values of elongation of 14½ per cent; reduction of area, 30.4 per cent; yield point, 109,900 lb. per sq. in., and ultimate strength, 129,050 lb. per sq. in. The fractures appeared laminated at right angles to the axis of the piece, as was expected from the nature of the material as brought out by the fractures obtained in the compression tests. Two flat test specimens were cut from one of the pins, longitudinally, so that the tensile stresses produced would coincide with the direction of the fibers. These pieces were of sufficient length to permit of using the 2-in. strain gage, so that strain readings could be taken for increasing loads. The results of this test were plotted as shown in Fig. 15. The tension tests as above described indicated that the elastic limit of the material of the shafts, both with and across the grain, was approximately 80,000 lb. per sq. in. Also that the ultimate tensile strength ranges from 120,000 to 130,000 lb. per sq. in., possessing a fair degree of ductility, the average elongation amounting to 15 per cent and the reduction of area to 38 per cent, and although the structure of the metal is different in the two directions tested there is no material difference in strength. Fig. 8 shows at A the end of the original shaft A which failed in the grips of the torsion testing machine. It clearly shows the manner in which the end of the shaft collapsed and sheared, due to the reduced sectional area. At B is shown the full sized tension specimen, illustrating the extent to which the end was compressed by the gripping action of the jaws of the testing machine, and also showing the character of the fracture produced. C illustrates the manner in which the mirror was attached to the shaft, during the torsional experiments. The four small tension specimens are mounted as shown at D, Fig. 8.

After completing the various tests described which were to determine the effects upon the physical properties of the material, due to the existence of so-called "hair-line" defects, a series of metallographic tests were made. These tests were to supplement the physical tests in order to reconcile the results of the same and to determine the exact nature of the "hair-lines."

The chemical analysis of the shaft was as follows:

Carbon	0.36	to 0.48
Manganese	0.70″	to 0.84
Phosphorus	0.01″	to 0.034
Sulphur	0.018″	to 0.042
Chrome	0.85	to 1.14
Nickel	1.20	to 1.43

A piece of the defective bearing was cut along A-A, Fig. 9. After polishing the sample for non-metallic inclusion, it was treated with picric acid in alcohol to

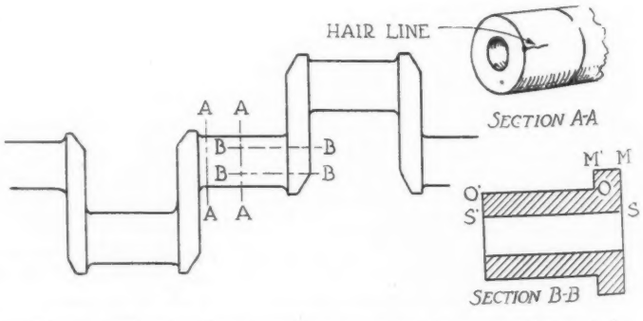
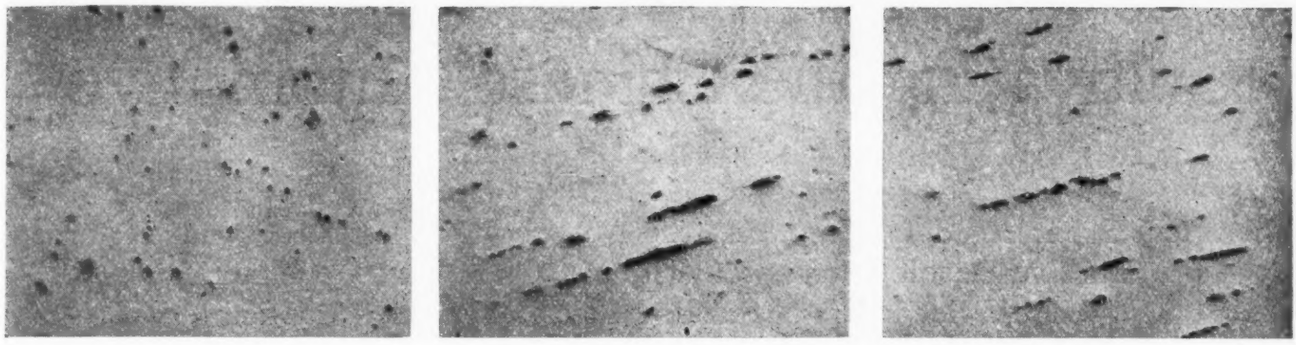


Fig. 9—Showing how sections were cut, from which metallographic studies were made



Figs. 10, 11 *and* 12—*Metallographic sections, showing dots of manganese sulphide and oxide of iron*

develop the structure and careful metallographic observations were made. It was noted that the material was full of dots of manganese sulphide and oxide of iron. It was plainly seen that below the "hair-lines" there was no evidence of any flaws, the metal appearing more or less normal. This was an indication that the "hair-line" was entirely a superficial defect. The dots of manganese sulphide can be plainly discerned in Fig. 10. By referring to Fig. 10 it will also be noted that the metal appears streaky, as if segregated areas had been laminated by forging. These streaks were more definitely developed by etching. It was also noted upon etching the metal that the structure was prominently martensitic, being coarser on the inside of the section which was cut than on the side nearer the finished surface, or outside. The streaks referred to are plainly seen in Fig. 10 to run diagonally. These streaks in their particular arrangement are not considered an uncommon occurrence in chrome nickel steel forgings, and their existence is believed to be due to the segregation of the chromium.

Another sample was cut from the shaft, as indicated by the lines B-B, and upon metallographic observations of the same it was noted that the manganese sulphide and oxide of iron lines appeared drawn out into fine strands. The direction of these fine strands was parallel to the forging or length of the shaft. These parallel lines of manganese sulphide continue for some distance, then bend over, become shorter and finally appear as dots, as can be seen in Figs. 11 and 12. In other words, referring to Fig. 9, Section BB, the manganese sulphide lines appear drawn out into lines parallel to the forging or length of the shaft, along the surface O'O and cross sections at M'M of section BB. This confirms the supposition that the "hair-lines" are threads of manganese sulphide and iron oxide, drawn out by forging operations so they would naturally appear in longitudinal sections at O'O and cross sections at M'M. On etching, the structure was martensitic, as before, and decidedly streaky along O'O (Figs. 11 and 12).

In order to determine whether the streakiness referred to was due to segregation or not, a longitudinal section at 90 deg. to the section BB was taken and heated to 840 deg. C., held at this temperature for 30 minutes and slowly cooled in the furnace. Upon etching the metal was found to be strongly laminated, and the ferrite strung out parallel to the direction of the forging. Fig. 13 shows the structure at O'S', Section BB, Fig. 9. Fig. 14 shows the structure of the cross-hatched area of Section BB, with the ferrite bands broader and slightly inclined. Hence it is reasonable to assume that the streakiness is due to the segregation of chromium.

Summary

As a result of the physical and metallographic tests carried out the following conclusions were derived:

(1) The torsion test indicates the elastic limit of the central portion of the shaft to lie between 60,000 and 70,000 inch-pounds, corresponding to a shearing stress of 49,400 pounds and 67,600 pounds per square inch.

(2) Compression tests indicated that the surface defects, three of which had been previously strained in torsion beyond the elastic limit of the materitl, did not develop any signs of local weakness until considerable deformation was produced.

(3) Tensile tests were made, three with the fibre and two across the fibre. These tests showed that there is no material difference in strength parallel with or across the fiber. The elastic limit of the material in tension is

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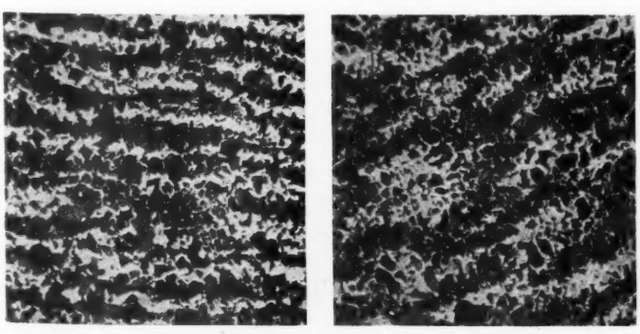


Figs. 13 *and* 14—*Metallographic sections, showing streakiness supposed to be due to segregation of chromium*

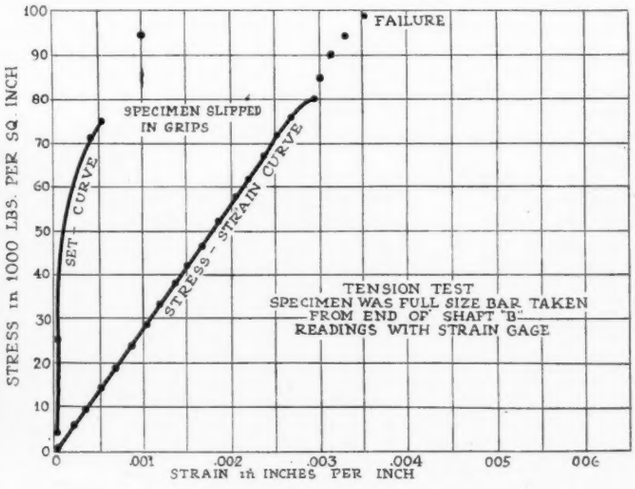


Fig. 15—*Stress-strain and set curves of crankshaft specimen*

Cultivating the Chinese Automotive Field

There Is a Great Need for Cars, But the Absence of Good Roads Has Retarded Automotive Development—Majority of Cars in Use Are American—High-Priced Cars of Striking Color Have Been Popular

By Tom O. Jones*

CHINA'S future as a market for motor vehicles depends absolutely on the construction of roads throughout the country. While the population of the Republic is said to be over 400,000,000, there are many millions of Chinese of the coolie class who never in their lifetime can hope to do more than make the barest kind of a living and countless numbers of the lower middle class who are far away from car ownership. Even if the buying power of the people were many times greater, the market for motor vehicles would be extremely small because of lack of highways. No matter how wealthy a resident of any district may be or how great his desire to own a motor vehicle, he will not purchase if there is no place in which the car can be used.

It may be said that China has no roads outside of those found in the foreign concessions of the treaty ports, but this statement is not strictly true, because in Peking there are nearly 150 miles of streets, including those of the legation quarter, that are suitable for motor cars, and there are short stretches of roads scattered throughout the Republic that might be used.

This report does not cover all China, but only the central and northern parts. Central China is taken to designate the Yangtze Valley, while North China the territory of which Tientsin is the chief treaty port and distributing center.

In these districts there are, at the present time, approximately 2000 motor vehicles in operation, practically all of them passenger cars and the majority of American manufacture. It is the territory destined to furnish the best market for motor cars, largely because the topography of the country is more favorable to road building.

The principal buyers of motor vehicles in China have been the foreign residents in the treaty ports, but it is evident that the market in this field is limited, although the foreigners in China must be considered as offering better prospects for motor-car sales than the same number of citizens in an American city. The future of the motor car in China lies with the Chinese themselves, and it is this field that the wise motor dealer in that territory is now cultivating.

Generally it may be said that the Chinese are favorable to the motor car, especially the younger generation. At present their choice is a high-priced distinctive car of striking color, fitted with as many accessories as possible, but men who know China are convinced that the small and medium-priced car will be the popular car of the future.

Customs and Habits Change Slowly

The Chinese are slow in changing customs and habits which have been followed for centuries. Until comparatively a few years ago the sedan chair and the native wheelbarrow, with its large wheel in the center, were practically the only means of passenger travel in all parts of the Republic, even among the wealthy, and they are to-day in many sections. With the advent of the European came the coolie-drawn jinrickshas, now found in hundreds of thousands all over China, and with them the use of horse-drawn carriages, two vehicles now generally used by both the Chinese and the Europeans.

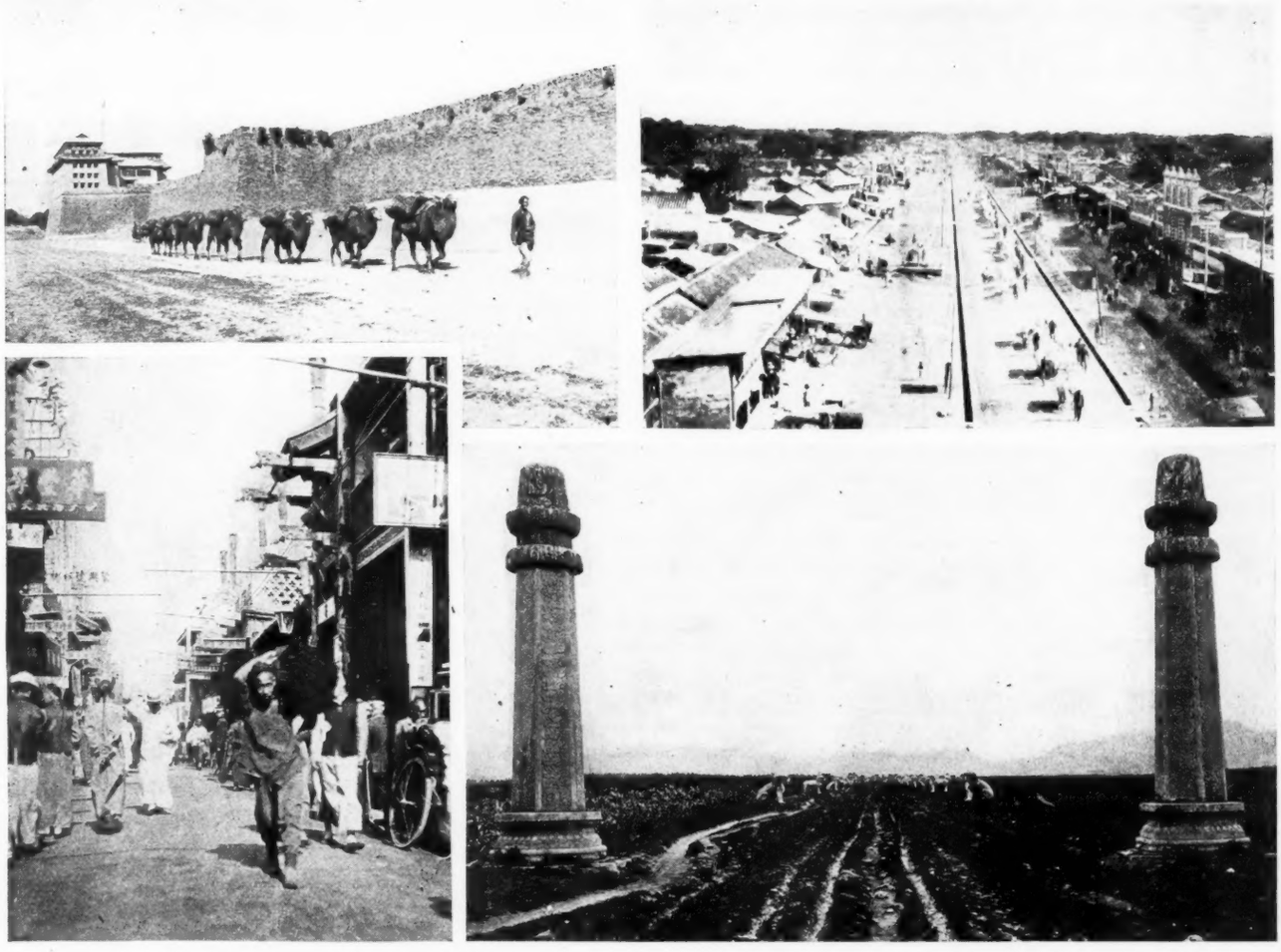
Practically all the motor-car selling in China is in the hands of the Europeans or Americans in treaty ports.

Camels, donkeys, jinrickshas, Peking carts and rambling pedestrians do not add to the pleasure of motor car driving in China

EDITOR'S NOTE—Mr. Jones was formerly with the J. B. Crockett Co., New York, and was given a special appointment by the Bureau of Foreign and Domestic Commerce to investigate automotive conditions in Japan, China, the Philippines and Hawaii. This story is taken from the advance proof sheets of Mr. Jones' report to his department.

In North China camels solve transportation problems

Ideal Chinese road, the center macadam and the sides dirt



Narrow city street in China with a good road surface but too crowded for vehicular traffic

One of the reasons why there is no motoring outside cities in North China. This was probably a good road in the Ming dynasty, several hundred years before the advent of the motor car

Most companies make contracts directly with the motor-car dealers, although some are held by importing houses, either independent concerns or branches, which are given territorial rights for certain sections. For the American manufacturer the most satisfactory connection should be an American firm, a policy that we would do well to follow to a greater extent in our general export business. This is said not in disparagement of any of the European houses, but simply as an American business principle, and one that is applicable in all countries.

The established dealers in China are in position to pay cash against shipping documents, either through their own resources or by arrangement with their banks at an interest charge of about 7 per cent. It should be borne in mind that the treaty ports have been one of the best fields in China for European cars of all types, and here, as in other parts of the world, the American manufacturer may be forced to make some financial concessions to meet this European competition after the war.

When selling to Europeans, the dealer, of course, deals directly with his customer, and the same is true in many sales to Chinese buyers. But often the salesman has to work through several intermediaries and pass out "presents" to each. One representative in Peking, before sending a salesman out, usually lets him know just how much can be given as presents. He told of one case in which this had been done, and the buyer had ordered a car, but before it could be delivered and payment received, there was one intermediary who had been overlooked and who had to be taken care of to the extent of $70 before the deal could be consummated.

Prices of cars are rather generally known through their advertising, although there may be changes in prices between different shipments, so that it is not well for the dealer to allow his prices to vary too greatly.

Types of Cars for China

It is impossible to point to any one car and say that this is the type that will meet with the greatest favor in the general market in China. Open or closed body, long or short wheel base, high or low price, influence sales in about the same proportion as in America. There is a field for all types and all prices. The population of China, at least the motor-buying portion of it, is probably the most cosmopolitan in the world. In the treaty ports, the European colonies and Peking are thousands of foreigners from every country in the world. Manifestly, the buying power and choice of this foreign population is varied.

As a whole, the foreign population in China would probably show a greater buying power than any other

(*Continued on page* 1122)

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The Automobile

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The Inventor's Opportunity

IN all the history of industrial development there probably have never been such opportunities to get manufacturing concerns to take up new articles as there are at the present time.

Thousands of manufacturing plants have been engaged on war work, and a great majority of these suddenly had their contracts canceled while working on them to full capacity. Of course, many of these previous to the war were engaged in well established lines of manufacture to which they will return. Others, however, were specially organized for munitions or other lines of work directly connected with the war; their products have been of a nature for which there is little or no call in peace times, and they are confronted with the difficult task of quickly shifting to other lines for which there is an established peace-time market unless they want to see their organizations disintegrate.

Under ordinary conditions the inventor or industrial pioneer has a most difficult time getting manufacturers interested in his inventions. Conservatism is a common quality of human nature, and as long as there is a fair demand for his product a manufacturer is apt to be disinclined to make radical improvements or take on entirely new lines. Under such conditions it is the task of the inventor to overcome the obstacle of conservatism, and that often proves beyond his powers.

At the present time, in the case of concerns which have been suddenly left without a line of marketable products, there is absolutely no such obstacle to overcome. The inventor of a practical device for which a ready sale can be found not only has no difficulty in getting a hearing but is actually being sought after.

The average inventor does not make a good manufacturer. He is too much wrapped up with the glamour of invention—too much bent on improving things—to be content to settle down and produce a standardized article. Of course, if we go back three or four decades it is not difficult to mention a considerable number of inventors who became successful manufacturers; but, in the first place, there are exceptions to every rule, and, secondly, manufacturing in those days was not conducted on the same lines as it is now.

To-day, with numerous firms having excellent manufacturing equipment and splendid organizations looking for new products to take up, the inventor who has an article of merit certainly stands an unprecedented chance of reaping his due reward.

Cast Connecting Rods

ALTHOUGH every engineer familiar with high-speed combustion engines knows that, owing to the inertia of the reciprocating parts, the maximum upward or tensional force on the connecting rod is about equal to the maximum downward force or pressure, very few keep this fact constantly in mind. It is of great importance in determining the suitability of certain metals for connecting rods. For instance, some of the cast metals have as high a compressive strength as wrought steel and, therefore, if compression stresses had to be withstood only they might be quite as serviceable as steel. However, the stresses on the material of a connecting rod are of an alternating character, and the tensile strength of a metal intended for connecting rods is as important as its compressive strength. This is undoubtedly one of the reasons why cast steel for connecting rods has been discarded. Of course, there is the further objection to it that defects in the castings, such as blowholes, are likely to cause much trouble. For any work where the stresses alternate and where it is desirable to keep down the weight to a minimum a metal of low tensility is not likely to prove satisfactory even though it may be of low specific gravity.

No comparison with the piston is possible, as the conditions of operation are quite different. The mechanical stresses in the piston can be kept down, but there must be provision for rapidly transmitting heat from the piston head to the skirt, which is easier to accomplish with aluminum than with steel.

Shortening the Power Plant

IT is practically universally recognized that engine length, when considered relatively to horsepower output or torque, is decreasing. This is a more important factor than appears on the surface. In the first place, length of engine vitally affects the length of wheelbase required. Given a chassis of a definite wheelbase and a definite weight, which requires a definite horsepower or torque to give satisfactory performance, the shorter the engine the easier it will be for the body designer to provide adequate comfort for the passengers.

The whole development of the powerplant for automobiles has been along lines of greater compactness and at the same time greater output for a given bore and stroke. The adoption of block cast cylinders was one step in this direction which even the increase in sizes did not exactly offset. One of the chief talking points in connection with the V-engine always has been the fact that it requires a minimum length of hood for the displacement and output.

Present Engines Are Shorter

Taken as a group, the engines employed in 1918 cars are remarkably short as compared with engines of 5 years and more ago. The compactness of design has been secured, of course, through the use of block castings, through compact waterjacket space, through shorter and stiffer crankshafts, V-shaped fan belts instead of flat belts, and in some cases by the utilization of the V-type of radiator, which allows the fan to project inside from 1 to 2 inches.

It is easy to see that with the L-head type of engine, in which the valves are all strung along in a single line, one of the determining factors of engine length is valve size. With the three-bearing type of crankshaft on the four-cylinder engine and the four-bearing type on the six-cylinder engine, the matter of crankshaft design is also a deciding factor. In fact, it is the belief of some engineers that, though shortening of the powerplant saves wheelbase and makes it possible to have a long, roomy body, it is a mistake to skimp on crankshaft bearings. In other words, it is useless to design crankshafts with large pins and large bearings unless there is length enough to make the cheeks of the cranks so that they are in keeping with the large diameter of the pins and bearings. These arguments are, of course, incontrovertible, except for the fact that in a large number of instances engine length is not determined by the crankshaft but by other factors, such as too great a distance between cylinder centers, necessitated by large valve diameters and sometimes even by the mountings of accessories and auxiliaries, such as the generator, fan, water pump, ignition drive, starting motor, etc.

The fact that an engine of the design of the Liberty aircraft type can run under full load for 150 hours and more shows that careful workmanship, coupled with good design, permits of extreme shortening, while at the same time crankshaft bearing failures are kept down to a minimum. The Liberty engine, from the tip of the propeller hub to the center line of the water heater, measures 69 5/64 in., with a power output of approximately 400 hp. This is remarkably short and sufficiently indicative of the fact that shortening need not be accompanied by structural weakness.

Overhead Camshaft Improvements

There is little doubt that we will see some marked improvements along the lines of overhead camshaft engines within the next 2 or 3 years. Fully 75 per cent of the engines now down on the drawing boards in designing rooms are of the overhead type. While this type of engine is higher than the L-head, one of its distinct advantages is the possibility for making it appreciably shorter than an L-head type of the same output. The valves are arranged on opposite sides of the cylinders, thus eliminating valve dimensions as a factor in the length of the engine. The camshaft bearings take up no more space than if they were within the crankcase. The valve drive need not take up any more space, and although the height of the engine is greater, this conforms very nicely with modern practice which favors a high, narrow radiator and elimination of the sharp break at the cowl.

With side-by-side valves it is practically impossible to get much shorter engines than we now have. This is evidenced by the fact that in a few instances when it was decided to increase the valve size on certain engines, it was necessary to lengthen the cylinder block slightly to take care of the valve increase. With this condition and with the certainty that the demand for lighter cars with equal passenger space and better performance is going to increase, it is almost sure that some designers will be driven to the overhead camshaft with valves on each side of the engine. The good performance of airplane engines, which require the most refined engineering to produce the greatest torque for a given weight, has certainly vindicated the overhead camshaft type of engine where manufacturers can afford the high class workmanship necessary with this type. It is quite probable that improved design will eliminate the necessity of working to such close limits as are required in aircraft practice. On the other hand, the war has been a great educator, teaching workmen to do their work rapidly and at the same time accurately. This will enable us to build better engines for use in automobiles.

If engines of the old type cannot be redesigned to accommodate them to less hood length, we should start on another tack and design engines of an inherently shorter type. There is no excuse for the production of heavy-weight cars to take four and five passengers when cars of shorter design and improved workmanship can be built which in performance will be far superior.

□ Latest News of the

Advocate Government Assistance for Development of Commercial Aviation

Annual Report of National Advisory Committee for Aeronautics Suggests Adoption of Comprehensive Policy—Great Amount of Investigation Work Started—Diesel Aircraft Engine Possibilities Considered

WASHINGTON, Dec. 23—A comprehensive Government policy calculated to develop aircraft construction for both civil and military purposes and to assure the existence of a nucleus of an aircraft industry is advocated in the annual report of the National Advisory Committee for Aeronautics made public here to-day.

Other recommendations resulting from the past year's experiences include a plan of co-operation of military and naval air service to insure continued training in long distance flying and to assist the development of the Aerial Mail Service. Legislation, it is suggested, should be enacted to regulate civil aerial navigation, the issuance of licenses to pilots, inspection of airplanes, uses of landing fields, etc., and such legislation should be drawn to encourage the development of commercial aeronautics. The estimates, states the report, submitted by the War, Navy and Post Office Departments should be given full consideration with a view to placing the United States foremost in the development of aviation for all purposes.

Investigate 38 Subjects

The report, which deals with the organization and functions of the committee, co-ordination of scientific and research work, technical reports, aeronautic problems and specifications for aeronautic materials, announces that 38 technical discussions will shortly be issued for the general public dealing with general aeronautic problems, including the structure of airplane fabrics, construction of propellers, engine difficulties, sparking, voltage, power characteristics and altitude experiments.

During the past year the committee and its sub-committees have made investigations which will result in the reports mentioned above, and which included inquiries into aircraft designs, studies of types of propellers, combinations of supporting surfaces, available materials of engine construction and special requirements of aircraft structures. A sub-committee on Navigation of Aircraft, Aeronautic Instruments and Accessories was formed, which co-operated with the War and Navy Departments to improve existing instruments and devise new ones.

New types of aviation engines were made a special study, and a sub-committee is at present investigating the possibilities of developing an aircraft engine embodying features of the Diesel oil engine. Experiments in scavenging two-cycle engines were made which will be continued in the near future. In addition there have been studies in supercharging to maintain power at altitude, improvement of engine details, radiation, carbureter, ignition and fuels and combustion improvements.

Two New Carbureters

Two types of automatic carbureter control have been developed to such a point, it is stated, that their operation is superior to any available hand adjustment. A third method is now under development and promises excellent results. An engine has been equipped with a new form of apparatus which determines absolute value of the rate of flame propagation in the study of fuels and combustion, and which it is expected will also measure the rate of combustion. Three special gas engine indicators have been under development. A greatly improved and simplified form of optical indicator of the polar type has been designed which it is expected will aid to obtain pressure diagrams of great accuracy.

An altitude laboratory has been constructed and has been in continuous operation throughout the year. Observations have been made on the effect of fuel composition on engine performance, changes of horsepower with altitude, changes of horsepower with speed at different altitudes, performance of carbureters at varying altitudes, heat distribution in engines, effect of supercharging and the effect of compression ratio on horsepower at different altitudes.

The sub-committee on Standardization and Investigation of Materials for Aircraft has conducted experiments on airplane wing beams, wing ribs and wing coverings, impact tests, variable chamber wing, steel construction for aircraft, etc. The results of these tests will be made public in the technical reports to be issued later. The substitution of steel or other metal for spruce in airplane wings resulted in construction of two complete sets of metal wings made of steel ribs and aluminum alloy beams, the ailerons being entirely of steel. These were tested at McCook Field, Dayton, and proved satisfactory.

Instruments are now being developed for recording in the air the torque and revolutions per minute of the engine, the thrust of the propeller, air speed, angle of attack and the inclination of the wing chord to the true horizon, and it is proposed to use such instruments to determine power plant performance and the relations in the air between the lift, drag, air speed and angle of attack.

The work already started by the Weather Bureau in the study of aeronautic atmospheric conditions and the daily reports on them is being furthered by a sub-committee on the Relation of the Atmosphere to Aeronautics. Papers on meteorolgy and aeronautics, mean values of free air barometric and vapor pressures, temperatures and densities over the United States, and the turning of winds with altitude have been prepared and distributed to the Aviation and Artillery Services. Special experimental tests and kite flights have been made at the various flying fields. Pilot balloon observations are made daily at military stations.

New Wind Tunnel Constructed

A description of the wind tunnel built for experimental purposes by the committee is included in the report. The tunnel building is brick and steel 43 ft. wide, 90 ft. long and 30 ft. high. It will house a 5 ft. modified Eiffel type of wind tunnel which has been designed to provide for lessening the diameter of the wind stream to 30 in. for high velocity investigations.

When operating with the 5-ft. section the air stream is left open across the operating room, and when operating with the 30 in. section the stream is enclosed as in the National Physical Laboratory type of tunnel. The wind tunnel proper will be equipped with a thrust torque dynamometer for propeller investigations and for determining the effect of the fuselage form upon propeller efficiency; also an aerodynamic balance for making accurate measurements on aerofoils.

(*Continued on page* 1119)

S. A. E. Victory Dinner Feb. 6

NEW YORK, Dec. 23—The Society of Automotive Engineers has set the date of Thursday, Feb. 6, for its Victory dinner. It will be held at the Hotel Astor, New York.

Automotive Industries

May Make and Sell "B" Parts

Producers Given This Permission, But Must Maintain Government Standards

WASHINGTON, Dec. 23—The Motors and Vehicles Division of the Quartermaster Corps has notified manufacturers of parts for the Class B standardized truck that they may make and sell the parts in the open market and may also make and sell completely assembled vehicles.

However, there are certain strings tied to the proposition and in view of these, various interpretations are placed on the action of the Government. For example, it is stated that the drawings, workmanship and material must be up to government standards; that gages must be maintained accurately and that the Government must be given the right to purchase such parts if an emergency arises.

It is believed that the action has been taken primarily to forestall the possibility of makers putting in claims for excessive amounts through the Court of Adjustment. Another angle is that the Government may perhaps be making a move toward obtaining the benefits of a subsidy plan without putting such a plan actually into effect. Following is the letter which outlines the plan; it was signed by Major A. B. Browne, Chief Truck Section, S. C., U. S. A.:

You are authorized to manufacture and sell parts of the United States Government "B" truck or the complete assembly of the "B" truck chassis commercially, provided that you adhere rigidly to the following:

(a) Firms manufacturing and selling the "B" truck as such for commercial trade must conform rigidly to the drawings, workmanship and materials specified by the Government. Any alterations or variations must be distinctly stated in all commercial literature and publicity.

(b) Gauges used in manufacture of such vehicles, in order to be authentic, must be checked and approved by the Bureau of Standards in Washington, by comparison with the master gauges there on file. Gauges must be maintained at this standard of accuracy.

(c) The Government reserves the right of free access at all stages of manufacture to its accredited inspectors, to see that the provisions of "a" are complied with.

(d) The Motor Transport Corps shall control the designs specifications of the "B" truck and these issued each year shall be authority during that year.

(e) Firms granted permission to manufacture and sell the Class "B" truck or parts must give the Government the right, upon immediate notice, to purchase all or such parts as the Government may desire, or its available and future Class "B" type vehicles, should emergency arise.

(f) The right of export and sales in foreign countries shall be restricted to American manufacturers.

(g) In all the above, where the term Class "B" truck is used, this shall apply—not only to the truck as a whole—but to any assembly unit or part thereof, such as engine, transmision, electrical equipment, or spare parts, and that as future Government models develop, wherein designs are initiated and controlled by the Government, this policy shall apply likewise to them.

(h) In granting this permission the Government assumes no responsibility and gives no authority under existing or future patent rights.

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Future Air Service

WASHINGTON, Dec. 24 — Reports and rumors are numerous here with regard to the future Air Service of the Army. While nothing definite can be said at this time, as the plans of the War Department are kept secret until they will be presented to Congress, current statements are to the effect that the future Army Air Service will be composed of approximately 500 officers and 5000 enlisted men. This would mean about 350 fliers and at the most the maintenance of a fleet of 1000 airplanes. It is said that present plans are for an Army of 400,000 men and if the Air Service in the future is to be proportionate to that maintained with our Army of 2,000,000 men which was 20 per cent, the figure stated above would be slightly below the requirements.

It appears that although the War Department is making its plans for presentation to Congress, these plans hinge on the outcome of the peace conference and the League of Nations, for it is expected that armament may be regulated in size to conform with the requirements of the platform which will be formed as a result of the League of Nations, if one is organized.

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M.A.M.A. Sanctions Boston and Chicago Shows

NEW YORK, Dec. 23—The Motor and Accessory Manufacturers' Association has formally placed its stamp of approval on two automotive expositions. It has sanctioned both the show which will be put on by the Boston Automobile Dealers' Association and the one to be staged by the Chicago Automobile Trade Association. Nothing has been done as yet in the way of issuing any sanction for the show to be staged in Madison Square Garden and the 69th Regiment Armory by the New York dealers. The annual meeting of the M.A.M.A. will be held at the Congress Hotel, Chicago, Jan. 29.

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Ford Publishing Co. Incorporates

LANSING, MICH., Dec. 23—The Dearborn Publishing Company, which is to publish Henry's Ford's newspaper, has been incorporated with a capital stock of $100,000, all common, and all subscribed and paid for in cash. The shares are $100 each, and of them Clara J. Ford has 334 and Henry Ford and his son, Edsel B., 333 shares each.

5% Motor Truck Tax Eliminated

Levy on Sale Price of Commercial Vehicles, Trailers and Tractors Cut Out

WASHINGTON, Dec. 24—There probably will be no tax on the price of motor trucks, motor truck trailers or tractors. The Senate Finance Committee has passed the new war revenue bill with this 5 per cent tax eliminated.

The 5 per cent tax on the sale price of passenger cars, motorcycles, parts and accessories remains in the bill, however. But the bill has not been finally passed as yet and it is expected that when it comes up before the general conference of the House and the Senate, a strong recommendation will be made that these taxes, too, be eliminated as being discriminatory against the automobile industry.

The removal of the tax on the sale price of trucks does not free such vehicles from all proposed taxation. There still remains a tax of 5 per cent levied on the amount of business done by the owner of a truck who operates over a fixed route in competition with the rail carriers.

Following the presentation of the bill before the conference of the House and the Senate, it will again be presented to the House and the Senate separately for final action.

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Wright-Martin Buys Simplex

NEW YORK, Dec. 23—As was forecast in AUTOMOTIVE INDUSTRIES last week, the Simplex Automobile Co., New Brunswick, N. J., was bought in by the Wright-Martin Aircraft Corp., which already controlled the company. The move was made merely to simplify the accounting methods of the Wright-Martin company and presages no changes in the Simplex company or its product.

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Mexico Shipped 5,505,834 Bbl. of Oil in November

TAMPICO, MEXICO, Dec. 21—Practically complete figures for the oil shipments from Mexico for the month of November are now available. They show a total of 5,505,834.02 bbl. as compared with 5,834,952.50 for the month of October. Of the November shipments, all were export except 283,589 bbl. by the Aguila Oil Company, which were coastwise.

October Exports to Latin America

Month's Figures Show Big Drop—Probably Caused by Transfer of Shipping

NEW YORK, Dec. 21—Although there has been a serious falling off in exports from this port to the various Latin American republics during the month of October, in comparison with the figures for September, the drop loses much of its significance when the fact that all available tonnage during the former month was devoted to transatlantic service. Since then, altered circumstances have relieved the tension in a measure and it is expected that in the near future our shipping facilities to Latin American ports will be more nearly equal to the demands made upon them.

In September the total value of cars, trucks and parts shipped from New York to Latin America was $1,205,359. In October the total dropped to $483,923, a falling off of nearly 60 per cent. Cars dropped from 651 to 119, trucks from 70 to 37, and the value of parts from $306,432 to $214,100.

A table showing the total exports from New York for the ten months of 1918, ending October, is also published. This shows a total value of exports of $10,281,871; an average of well over $1,000,000 per month. This average further indicates that October exports have been abnormally low.

Reclassifying Trade Statistics

WASHINGTON, Dec. 21—A reclassification of import and export statistics is being made by the Bureau of Foreign and Domestic Commerce in co-operation with other Government departments in order to provide a more logical arrangement, to facilitate tabulations and to increase the use of the statistics. The new classification will be on a decimal basis. All commodities are divided into ten main groups. For the purpose of export statistics the subdivision will be carried to four places. For imports the classification will be carried to five places. Rubber will be listed under plant products other than foods and woods. Essential oils will come under the same heading. Iron, steel, copper and lead will come under the group of ores, metals and metal manufactures. Passenger cars, trucks and farm implements, including tractors, will be entered under the heading of machinery, tools and vehicles.

Garford Has Highway Department

LIMA, Dec. 21—The Garford Motor Truck Co. has instituted a Department of Highway Development under the management of S. M. Williams, who has been for the last 4 years sales manager for the company.

EXPORTS OF AUTOMOBILES, TRUCKS AND PARTS FROM NEW YORK TO LATIN AMERICAN COUNTRIES FOR OCTOBER, 1918

	Cars		Trucks		Parts
	No.	Value	No.	Value	Value
Argentina	2	$14,345	..	.....	$52,247
Bolivia	..	.....	..	.....	350
Brazil	19	22,764	..	.....	9,649
Chile	9	16,341	5	$19,000	40,876
Colombia	4	3,601	..	.....	483
Costa Rica	..	.....	..	.....	527
Cuba	17	38,404	16	40,077	76,866
Ecuador	..	.....	..	.....	592
Guatemala	..	.....	..	.....	.....
Haiti	1	1,800	..	.....	501
Honduras	..	.....	..	.....	168
Mexico	13	15,490	..	.....	4,854
Nicaragua	1	1,488	..	.....	41
Panama	2	2,550	14	18,512	3,133
Paraguay	..	.....	..	.....	.....
Peru	17	26,269	..	.....	6,310
Salvador	..	.....	..	.....	.....
Santo Domingo	5	3,862	1	2,297	2,390
Uruguay	27	39,730	..	.....	8,998
Venezuela	2	2,313	1	1,000	6,115
	119	$188,957	37	$80,866	$214,100

EXPORTS OF AUTOMOBILES, TRUCKS AND PARTS FROM NEW YORK TO LATIN AMERICA DURING TEN MONTHS ENDING OCTOBER, 1918

	Cars		Trucks		Parts
	No.	Value	No.	Value	Value
Argentina	993	$1,080,168	33	$32,921	$1,187,391
Bolivia	11	15,191	2	9,000	5,200
Brazil	1,052	789,042	35	37,114	197,382
Chile	1,486	1,871,023	86	117,097	399,746
Colombia	103	73,312	1	600	20,680
Costa Rica	41	20,100	..	.....	1,561
Cuba	529	625,023	243	563,742	639,653
Ecuador	58	61,177	..	.....	6,835
Guatemala	5	8,099	1	322	2,704
Haiti	79	44,790	9	8,789	18,627
Honduras	20	19,927	..	.....	5,382
Mexico	192	192,892	34	74,110	61,361
Nicaragua	30	22,219	..	.....	1,191
Panama	50	41,593	42	38,135	33,116
Paraguay	1	2,500	1	875	768
Peru	467	575,570	57	126,535	76,220
Salvador	57	32,971	..	.....	3,731
Santo Domingo	198	152,884	13	12,397	33,805
Uruguay	1,134	659,085	11	11,000	126,154
Venezuela	97	76,965	6	16,900	46,296
	6,603	$6,364,531	574	$1,049,537	$2,867,803

Bureau of Mines' Annual Report

Many Investigations Undertaken and Experiments Planned and Completed

WASHINGTON, Dec. 21—The Bureau of Mines has issued its eighth annual report, which deals briefly with its many activities. The report was written prior to the armistice, and refrains from detail. It is also largely a compilation of work planned in conjunction with the prosecution of the war. Numerous investigations and experiments with ores, gases, petroleum and fuels were planned, and some completed.

An inquiry into manganese conditions developed that in event of shortage a large part of the country's requirements could be met by using low manganese alloys, as there are considerable quantities of low-grade domestic ores available. Investigation also showed that the Cuban output would increase to about 140,000 tons for 1918.

Investigations f possible domestic production of tin pointed to no prospect of any considerable output. An investigation is planned for the near future of the possible use of domestic graphite formed in crucibles.

A petroleum station costing $50,000 has been erected at Bartlesville, Okla., and will be used for experiments and inquiries into the formation of oil and water emulsions in wells, characteristics of oil sands, and methods of recovering maximum quantities of oil from sand.

Experiments conducted by the Bureau at the plant of the Michigan Smelting & Refining Co., Detroit, on electric brass melting by use of a 1300-pound capacity rocking furnace, showed good metallurgical results, the metal losses being markedly below those obtained by melting in coke-fired crucibles. The power consumption was low and, says the report, if the metal saving be considered, the over-all cost of melting brass and bronze in a rocking furnace is not more than one-third as compared with the coke-fire system under present crucible, fuel and metal prices. Following the experiments, the Michigan Smelting & Refining Co. has put in four 1-ton furnaces and two other Detroit firms have ordered similar equipment.

Experiments are being conducted with the Ordnance Department for preparation of a series of uranium steels, besides tungsten and molybdenum steels for gun liners. Special furnaces are being used, and so far an indirect-arc furnace has been found most suitable.

Volatilization of lead ores has proved successful, and the Bureau is now starting to apply the process to copper ores. The work done thus far is said to be successful.

The Bureau station at Salt Lake City has discovered and perfected methods of treating complex and oxidized ores of zinc. The precipitation of the zinc from

hydrometallurgical solutions, it is said, has been found most simple by the use of zinc sulphate, because a solution is the easiest to produce in practice and offers the least difficulty in successful precipitation. Enough limestone is added to the zinc sulphate to precipitate all of the sulphate as calcium sulphate.

After the limestone an excess of sulphur dioxide is added; this reacts with the zinc sulphate to form soluble-acid zinc sulphite and sulphuric acid, the latter being precipitated as calcium sulphate by the limestone. The calcium sulphate is removed by filtration, and the clear filtrate is heated to remove the excess SO_2 and at the same time form the insoluble normal zinc sulphite. This zinc sulphite is then filtered from the treated solution.

It has been found possible to recover 85 per cent or more of the zinc from the solutions in a zinc product carrying 38 to 43 per cent zinc and less than 2 per cent harmful impurities. On calcination at a low temperature the zinc sulphite breaks up to form SO_2 and nearly pure zinc oxide.

The work on the problem now consists of determining the various factors that affect operation and also any other data that would be of value in the commercial application of the process or make possible an easier estimation of its cost.

As air rapidly oxidized the zinc sulphite to sulphate and hence interfered with precipitation, a laboratory apparatus was developed in which all of the operations necessary will be performed out of contact with the air and in an SO_2 atmosphere.

The work of the Petroleum Division has included examination of 275 samples of fuel oil, representing deliveries amounting to nearly 20,000,000 gal., worth $800,000. Some 60 samples of lubricating oil, 135 samples of gasoline for trucks and airplanes, and 95 products, including products of special cracking processes, alleged gasoline improvers, etc., were analyzed. This work included tests of German gasoline and other fuels for airplanes both in flying and dynamometer experiments.

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Airplane Mail Increases 600 Per Cent

WASHINGTON, Dec. 19—Airplane mail has increased 600 per cent during the past month, post office officials announced yesterday. This is attributed to the mailing of Christmas cards by this medium, and also to the rate reduction on 1 oz. of first-class matter from 16 to 6 cents. This is the first Christmas that it has been possible to send a Christmas greeting in this way.

More than 600 pieces of first-class mail were sent by airplane to New York yesterday. Approximately 100 were sent on the corresponding day of last month.

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Hide Restrictions Off

WASHINGTON, Dec. 21—All restrictions on the importation of hides and skins have been removed by the War Trade Board.

Aircraft Department Annual Report

Records Enormous Progress Made in Training Aviation Specialists

WASHINGTON, Dec. 21—An appeal, by Premier Clemenceau of France, for 2000 planes a month, 5000 pilots and 50,000 mechanics, was the cause of the appropriation of $640,000,000, according to a statement in the annual report, Department of Military Aeronautics, made public here recently. The appeal of the French premier was received May 24, 1917, and within 60 days Congress passed the appropriation measures.

American army aviators in the United States flew over 30,000,000 miles in a single June week, or 1223 times the distance around the equator, according to the report. Flights were 407,999 hours in the fiscal year as against 745 hours in 1914.

"This country never had trained an aviator sufficiently to meet the demands of overseas aerial warfare," states the report, and "it had not the slightest knowledge of the instruction necessary for radio, photography or the enlisted personnel. Consequently, the first men largely trained themselves before teaching others, and experience led from one course to the next." Despite these handicaps, 4980 men had graduated as reserve military aviators by June 30, 1918, and 110 bombers, 85 bombing pilots, 464 observers, 389 observer pilots and 131 pursuit pilots had been graduated on that date from the advanced training schools.

Fatalities for the year ended June 30, 1918, totaled 152 in training, an average of 1 death for each 2684 training hours or 201,000 miles flown. Stalled engines, usually due to errors by pilots, caused 86 deaths; collisions 30 and side slips 10. The number of fatalities, says the report, averaged less than one-half of those of the larger allied countries.

The first American cadets were sent overseas for training within 6 weeks after the declaration of war, and by the end of 1917, says the report, more than 2500 men had been sent to France, England, Canada and Italy.

"The collapse of Russia and Italy's serious defeat made it impossible," says the report, "unfortunately, for the Allies to meet the training schedules, so that many of these cadets were in idleness for months. Nevertheless, what facilities were available greatly advanced America's aerial preparation and helped relieve the shortage of equipment here.

"It was early in May, 1918, that the first German plane fell a victim to an aviator in the American service. About the same time 468 fully trained American aviators, organized into 13 complete American squadrons with British and French squadrons, were actually on the front taking increasing toll of the enemy."

There were also 440 balloon officers graduated, according to the report, of whom 155 were fully qualified observers, during the fiscal year.

In conclusion, General Kenly states that while at the outset of the war there were but 65 officers in the air service, there were, on June 30, 14,320 and the enlisted strength increased in the same time from 1120 to 124,767, the men in training or waiting training as fliers, from less than 100 to more than 18,000. There were 4,872 officers and 46,667 enlisted men overseas.

Attention is also called in the report to the fact that within two years this country developed its aviation rapidly, installing radio outfits, manufacturing regular bombing planes and developing the Liberty engine.

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Appropriations for Aircraft Production and Operation

WASHINGTON, Dec. 21—In the appropriations asked of Congress for Air Service, $164,877,253.18 for the Army and $225,000,000 for the Navy, provision is made allowing $19,933,738.47 for Army aeronautics operations and $144,943,514.71 for Army aeronautics production.

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Government to Sell Airplanes

WASHINGTON, Dec. 21—The Department of Military Aeronautics plans to sell several hundred airplanes and engines on the open market. These are planes that have served their purpose as training ships, and it is believed there will be ready purchasers for them. It is expected that the sale to private owners will do much to popularize flying in the United States. Another possible market for more of these planes includes the nations of South America and other countries favorable to the Allies. The Czecho-Slav Government has already purchased 25 L. W. F. airplanes.

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Deeds Presented with Testimonial

WASHINGTON, Dec. 21—Col. Edward A. Deeds was presented with an engrossed testimonial by Col. Sidney D. Waldon on behalf of the original Equipment Division of the Signal Corps at a banquet in his honor at the Army and Navy Club last night. More than 100 high ranking officers, Government officials and aircraft manufacturers were present. The testimonial, bearing the insignia of the Air Service and the Signal Corps, expressed the confidence and esteem of the officers who were associated with Col. Deeds in determining the aircraft policies on which the Air Service was built. Major General George O. Squier, originally head of the Army Air Service, briefly described how it had been formed, and the class of men that made up its personnel. Brig. Gen. J. D. Cormack praised the Equipment Division and told of the difficulties it had to encounter. Seated at the speaker's table with Col. Deeds were Assistant Secretary of War Benedict Crowell, General Cormack, General Squier, Admiral D. W. Taylor, Orville Wright, Lt. Col. L. S. Horner and W. C. Potter.

Bill Would Legalize Contracts

Congressman Dent's Measure Provides Payment for Contracts "Illegally" Made

WASHINGTON, Dec. 23—A new bill has been drawn up by Congressman Dent authorizing the Treasury Department to pay manufacturers who hold Government war contracts which were not "legally" executed and which have been held up by a decision of the Controller of the Treasury. The bill restricts the authority of the Secretary of War considerably as compared with the first bill which was drawn up.

It provides that on June 30, 1919, a detailed statement must be presented to Congress by the Secretary of War showing the terms and nature of the contracts which will be paid under the authorization of the bill. It eliminates payments for contracts made during the war and not "legally" executed to June 30, 1919. It does not relieve any officer or agent of the Government from criminal prosecution and provides that the Government may prosecute regardless of provisions if fraud is found.

The names of all contractors and the amounts of the payments to them must be filed with the Clerk of the House and printed in the Congressional Record or Official Bulletin 10 days before the payment is authorized. It was expected that Congress would take action on the bill to-day, but other business prevented this, and it may come up for action to-morrow or be held over the holidays. Following is the complete bill:

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

"That the Secretary of War be, and he is hereby, authorized to adjust, pay, or discharge any agreement, express or implied, upon the basis of reasonable value but in no case greater than the agreed price that has been entered into, in good faith during the present emergency and prior to November 12, 1918, by an officer or agent acting under his authority, direction, or instruction, with any person, firm, or corporation for the acquisition of lands, or the use thereof, or for any supplies, material, or equipment to be used in the prosecution of the war, when such agreement has been executed in whole or in part, or expenditures have been made or obligations incurred upon the faith of the same by any such person, firm, or corporation prior to November 12, 1918, and such agreement has not been executed in the manner prescribed by law:

"Provided, that payment under such agreement shall not exceed the fair value of the property transferred or delivered and accepted by the United States, as determined by the Secretary of War, and where no property has been transferred or delivered, or accepted payment shall not be in excess of the actual cost incurred in preparation for performance, as such cost is determined by said Secretary:

"Provided further, That this Act shall not authorize payment to be made of any claim under such agreements after June 30, 1919:

"And provided further, That the Secretary of War shall report to Congress at the beginning of its next session following June 30, 1919, a detailed statement showing the nature, terms, and conditions of every such agreement and the payment or adjustment thereof:

"And provided further, That nothing in this Act shall be construed to confer jurisdiction upon any court to entertain a suit against the United States upon any agreement of the character herein provided for:

"And provided further, That no settlement of any claim arising under any such agreement shall bar the United States Government through any of its duly authorized agencies, or any committee of Congress hereafter duly appointed, from the right of review of such settlement, nor the right of recovery of any money paid by the Government to any party under any settlement entered into, or payment made under the provisions of this Act, if the Government has been defrauded, and the right of recovery in all such cases shall extend to the executors, administrators, heirs, and assigns, or any party or parties:

"And provided further, That nothing in this Act shall be construed to relieve any officer or agent of the United States from criminal prosecution under the provisions of any statutes of the United States for any fraud or criminal conduct:

"And provided further, That this Act shall in no way relieve or excuse any officer or his agent from such criminal prosecution because of any irregularity or illegality in the manner of the execution of such agreement:

"And provided further, That the names of such contractors and the amounts of such partial or final settlements shall be filed with the Clerk of the House for the information of Congress and printed in the Congressional Record, or in the Official Bulletin, or as a public document, 10 days before confirmation and payment is authorized upon such contracts."

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Menoher Made Aircraft Head

WASHINGTON, Dec. 23—Major General C. T. Menoher, who has been in command of the Rainbow Division in France, is returning to the United States to become Director of the Bureau of Aircraft Production. Col. James A. Mars, who is at present Director of Aircraft Production, as was announced last week, succeeding W. C. Potter in this position, will probably be made the Assistant Director under General Menoher.

The appointment of General Menoher probably means that the Bureau of Aircraft Production will be made a part of the regular military organization, and probably General Menoher will be assigned to the General Staff to effect this co-ordination. This would mean a continuation of two separate air divisions—one for production and one for operation, with the latter under Major General Kenly. Heretofore the Bureau of Aircraft Production has been chiefly a civilian department. It was operated originally as the Aircraft Production Board in conjunction with the Equipment Division of the Signal Corps, and at that time was headed by civilians, including Howard E. Coffin and W. C. Potter. With the reorganization last spring, when the Bureau of Aircraft Production was formed, John D. Ryan was appointed to head it with W. C. Potter as Assistant Chief, both civilians.

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War Industries Board Withdraws All Pledges

WASHINGTON, Dec. 20—All restrictions and orders of the War Industries Board and all pledges given to the War Industries Board by industries are canceled, effective Jan. 1, 1919, according to formal announcement made to-day by the board. This means that all restrictions in the purchase of steel and other commodities and in the manufacture of passenger cars, motor trucks and other automotive products and accessories are completely removed and normal peace time business can resume with the New Year.

39 Aero Squadrons in Service

United States Had This Many on the Front When the Armistice Was Signed

WASHINGTON, Dec. 23—On Nov. 11, when the armistice was signed, there were 39 American aero squadrons distributed on the front, including 20 pursuit, one night bombardment, six day bombardment, five Army observation, 12 corps observation and one night observation squadron.

American fliers brought down 491 confirmed and 354 non-confirmed enemy planes up to that day, a total of 845. During the same period the American forces lost 271 planes. Eighty-two enemy balloons were destroyed as against 45 American balloons.

The American air service in the front zone included 2161 officers and 22,351 soldiers, a total of 24,512. During the period between Sept. 12, 1917, and Nov. 16, 1918, the A. E. F. received from all sources 3337 service planes and 90 school planes for pursuit, 421 service planes and 85 school planes for day bombing, 3421 service planes and 664 school planes for observation and 31 planes for night reconnaissance in addition to 2385 training planes, 30 experimental planes and 108 miscellaneous.

Eight different schools under American control were established in France and designed for training 3800 officers and 11,700 men, as follows:

Tours—Observers:
916 officers
2121 soldiers
Issoudun—General Flying:
2175 officers
6100 soldiers
Clermont—Ferrand—Bombardment:
120 officers
660 soldiers
St. Jean-De-Monte—Aerial Gunners:
92 officers
1500 soldiers
Meucon—Artillery Firing Point:
20 officers
110 soldiers
and
Chatillon-sur-Seine—Observers:
204 officers
383 soldiers
Souge—Artillery Firing Point:
259 officers
750 soldiers
Coetquidan—Artillery Firing Point:
25 officers
120 soldiers

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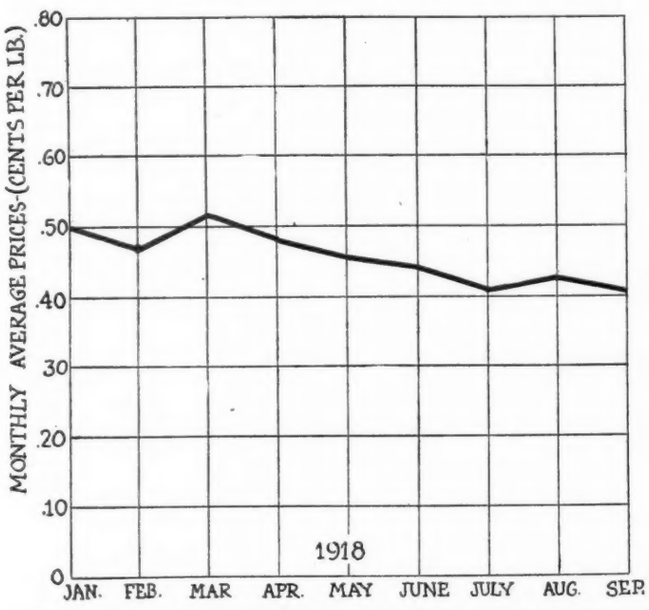
England Lightens Driving Restrictions

LONDON, ENGLAND, Dec. 1—*By mail*—England has partly removed the restriction on the use of motor cars and trucks by private owners. Effective to-day owners are permitted to drive free of restraint to the limit of the gasoline allowance and within a thirty mile radius of London. It is still necessary for those who buy gasoline to have permits from the Petrol Control Department. It is expected however that the necessity for such permits will soon cease to exist owing to the fact that military use of gasoline is very rapidly decreasing and imports are increasing.

AUTOMOTIVE MATERIALS MARKETS

Materials Market Prices

Acids:
Muriatic, lb. ..... .02 -.03
Phosphoric (85%).. .35 -.39
Sulphuric (60), lb.. .006
Aluminum:
Ingot, lb. ..... .33
Sheets (18 gage or more), lb. ..... .42
Antimony, lb. ..... .13¾-.13⅞
Burlap:
8 oz., yd..... .17¼-.17½
10½ oz., yd..... .21½-.22
Copper:
Elec., lb. ..... .26
Lake, lb. ..... .26
Fabric, Tire (17¼ oz.):
Sea Is., combed, lb.1.65-1.70
Egypt, combed, lb.1.25-1.35
Egypt, carded, lb.1.20-1.30
Peelers, combed, lb.1.05-1.20
Peelers, carded, lb. .95-1.05
Fibre (⅛ in. sheet base), lb. ..... .50
Graphite:
Ceylon, lb. ..... .09 -.22
Madagascar, lb. .. .10 -.15
Mexico, lb. ..... .03¾
Lead, lb. ..... .06¾-.07¼
Leather:
Hides, lb. ..... .18 -.35¼
Nickel, lb. ..... .40
Oil:
Gasoline:
Auto, gal. ..... .24½
68 to 70 gal..... .30½
Lard:
Prime City, gal..2.30-2.35
Ex. No. 1, gal...1.62
Linseed, gal. 1.63-1.65
Menhaden (Brown), gal. 1.35-1.36
Petroleum (crude), Kansas, bbl. 2.25
Pennsylv'a. bbl...4.00
Rubber:
Ceylon:
First latex pale crepe, lb. ..... .54
Brown, crepe, thin, clear, lb. ..... .50
Smoked, ribbed sheets, lb. .... .52
Para:
Up River, fine, lb. .62½
Up River, coarse, lb. ..... .36½
Island, fine, lb.. .53
Shellac (orange), lb.. .70-.72
Spelter ..... .08½-.08¾
Steel:
Angle beams and channels, lb. .... .03
Automobile sheet (see sp. table).
Cold rolled, lb..... .06½
Hot rolled, lb..... .03½
Tin ..... .71-.72
Tungsten, lb. 2.00-2.50
Waste (cotton), lb... .12¾-.17



The average import price per pound for crude rubber for each month from January to September, 1918. The tendency to lower prices seems at variance with the reduced quantity of crude rubber available

AUTOMOBILE SHEET PRICES

(Based on No. 22 Gage. Other gages at usual differentials)

	Primes only per 100 lbs.	Primes when seconds up to 15 per cent are taken per 100 lbs.
Automobile body stock.....	$5.95	$5.85
Automobile body stock, deep stamping	6.20	6.10
Automobile body stock, extra deep stamping	6.45	6.35
Hood, flat, fender, door and apron, or splash guard stock.....	6.05	5.95
Crown fender, cowl and radiator casing, extra deep stamping	6.55	6.45
Crown fender, cowl and radiator casing, deep stamping	6.30	6.20

Automobile Sheet Extras for Extreme Widths:
Nos. 17 and 18 over 36 in. to 44 in., 10c. per 100 lb.
Nos. 19 and 21 over 36 in. to 44 in., 30c. per 100 lb.
Nos. 22 to 24 over 26 in. to 40 in., 40c. per 100 lb.
Nos. 22 to 24 over 40 in. to 44 in., 80c. per 100 lb.

Black Sheet Extras to Apply to Narrow Widths:
Oiling, 10c. per 100 lb.
Patent leveling, 25c. per 100 lb.
Resquaring, 5 per cent of gage price after quality, finish and size extras have been added.

Seconds 10 per cent less than the invoice Pittsburgh price for corresponding primes.

Automobile Securities on the Chicago Exchange at Close Dec. 21

	Bid	Asked	Net Ch'ge
Auto Body Company.....	5	8	..
Briscoe Motor Car, com.....	11	..	..
Briscoe Motor Car, pf.....	40	55	..
*Chandler Motor Car.....	105	107	—3½
Chevrolet Motor Car.....	149	151	—4
Cole Motor Car Co.....	90	105	..
Continental Motors, com....	8	8⅝	—¼
Continental Motors, pf.....	92	96	..
Edmunds & Jones, com.....	20	22	..
Edmunds & Jones, pf.....	75	90	..
Electric Storage Bat.....	49	57	—1
Federal Motor Truck.....	32	35	+2
Fisher Body Co., com.....	35½	38	..
Fisher Body Co., pf.....	92	94	..
Ford Motor of Canada.....	235	245	+10
General Motors, com.....	130½	131½	+5
General Motors, pf.....	81	83	+⅜
Hupp Motor Car, com.....	4½	5	..
*Hupp Motor Car, pf.....	84	88	+3
Kelsey Wheel Co., com.....	26	30	+2
Kelsey Wheel Co. pf.....	85	90	..
Manhattan Electric S., com. ..		48	..
Maxwell Motor, com.....	29	30	+½
Maxwell Motor 1st pf.....	52⅛	53⅛	+⅛
Maxwell Motor, 2nd pf.....	21	22	+⅞
McCord Mfg., com.....	30	35	..
McCord Mfg., pf.....	90	95	..
Mitchell Motor Co.....	25	35	..

	Bid	Asked	Net Ch'ge
Motor Products Corp.....	40	..	..
Nash Motors Co., com.....	175	200	..
Nash Motors Co., pf.....	90	95	+3
National Motor Co.....	9	12½	..
Packard Motor Car, com...	108	116	+3
Packard Motor Car, pf.....	97½	..	..
Paige-Detroit Motor, com...	23	24	..
Paige-Detroit Motor, pf....	8¾	9¾	..
Peerless Motor Truck.....	18	21	+1
Pierce-Arrow Mot. Car, com.	41½	42½	—2
Pierce-Arrow Mot. Car, pf..	103	104	—½
Premier Motor Corp., com...	5	..	+1
Premier Motor Corp., pf....	..	75	..
Prudden Wheel Company...	15½	17½	..
*Reo Motor Car Co.....	20¼	21	—1½
Republic M. Truck, com....	35½	38	..
*Republic M. Truck, pf.....	87	90	—2
Saxon Motor Car, com.....	7⅝	9⅝	—⅝
Scripps-Booth Corp.	21	25	..
Stewart Warner Speed. Corp.	78	80	+1
Stromberg Carburetor Co...	33	38	+2
Studebaker Corp., com.....	51¾	52¾	+⅛
Studebaker Corp., pf.....	90	92	—3
Stutz Motor Car Co.....	49⅞	51⅞	—2⅛
United Motors Corp.....	33½	35½	..
*White Motor Co.....	43⅞	44⅞	—3⅛
Willys-Overland, com.	24⅞	25⅞	..
Willys-Overland, pf.	88	89	..

Rubber Stocks	Bid	Asked	Net Ch'ge
Ajax Rubber Co.....	66	68	..
Firestone T. & R., com.....	125	130	..
Firestone T. & R., pf.....	99	101	..
Fisk Rubber Co., com.....	60	65	..
Fisk Rubber, 1st pf.....	97	103	..
Fisk Rubber, 2nd pf.....	80	84	..
Fisk Rubber, 1st pf. conv...	90	97	..
Goodrich, B. F., com.....	56	57	..
Goodrich, B. F., pf.....	⅜	½	+⅜
Goodyear T. & R., com.....	212	220	+2
*Goodyear T. & R., 1st pf ...	¼	..	—¼
Goodyear T. & R., 2nd pf...	100	102	..
Kelly-Springfield, com.	68½	½	+½
Kelly-Springfield, pf.	80	91	..
Lee Tire & Rubber Co.....	23	24¼	+1
Marathon Tire & Rubber.... ..		55	..
Miller Rubber Co., com.....	142	148	..
Miller Rubber Co., pf.....	95	98	+1
Rubber Products Co..... ..		101	..
Portage Rubber Co., com...	145	149	..
Swinehart T. & R. Co.....	50	60	..
U. S. Rubber Co., com.....	77	78	+3
*U. S. Rubber Co., pf.....	109	110	+1

*Ex Dividend.

French army trucks being overhauled preparatory to being sold. In this lot of war-worn vehicles are a number of captured German Mercedes

French War-Worn Vehicles Sold

Government Has Realized $6,000,000 for 2789 Trucks, 2884 Cars and 1826 Motorcycles

By W. F. Bradley

PARIS, Nov. 20—A year before the war came to a close the French Army inaugurated a system for placing its surplus automobiles and trucks at the disposal of the public. Up to the present date these sales of war-worn automobiles have enriched the State treasury to the extent of more than $6,000,000. The sales cover 1134 trucks, 1655 light trucks, 2884 touring cars, 1826 motorcycles and 2145 units such as motors, transmissions, etc. Thus 7499 automobiles have been placed at the disposal of civilian users at a time when transportation is most urgently needed.

A big exhibition ground has been established on the Champ de Mars, immediately behind the Eiffel Tower, and on this ground every kind of gasoline propelled vehicle from a single-cylinder motorcycle to a 10-ton artillery tractor can be purchased. All the automobiles offered for sale are unfit for further service with the armies in the field. While they are defective in some way, they are far from being totally disabled. The French plan is not to sell junk, but to put at the disposal of the public old vehicles which can be patched up so as to give very satisfactory service in civilian life.

These automobiles are picked out of the huge reception park in which the cast-off material from the army is received. A small group of experts decides which of these vehicles shall be turned over for sale, and which shall be dissembled for parts or repaired to go into use with the army service of supply.

In picking out the vehicles to be sold the experts first of all take the odd cars or the odd models—cars or types which are not used to any great extent in the service. All the old type powerful touring cars, of 1910, 1911 and 1912 vintage, are eliminated. Most of the captured German automobiles are turned over for sale; cars and trucks which have not given very great satisfaction in war work are got rid of; finally the more modern vehicles are sold when there is a plentiful supply to be obtained from the factory.

As proof that the cars are not all junk, Louis Wagner's Mercedes, which won second place in the last French Grand Prix, is now in the exhibition ground for sale, and it is known when it passes into private service it will change hands at not less than $12,000, which is a higher price than some of the racing Peugeots were sold for in 1913 and 1914.

When cars and trucks are sent to the exhibition ground they are cleaned up and painted by army mechanics and made to present as good an appearance as possible. Usually once a week there is a public sale, and for about ten days before this sale every automobile can be examined in detail.

The entire sales organization is in the hands of Lieutenant Paris, a French automobile officer, who fixes a limit price for each truck or car. The public is invited to make bids in sealed envelopes, the highest bid received being the one accepted. Not more than 2 per cent of the automobiles are unsold.

Certain bodies, including municipal councils, government departments, charitable organizations, are allowed preferential bids. These are opened before the bids made by the general public, and, provided the minimum is offered, are sold to these bodies. There is no guarantee that the cars and trucks are in good running condition. Generally they have to be towed home. But provision is made to supply spare parts by stripping down certain chassis and letting the purchasers of trucks and cars have a prior right on these parts.

Many of these trucks are bought up by mechanics as a mere matter of speculation. In other cases the prospective purchaser gets in touch with a small mechanic and arranges with him to carry out the necessary work if purchase is concluded. Horses are so scarce in France and the automobile factories are so busy on war orders that these war-worn trucks are sold for almost as much as when they were new.

Tractors in Scotland

WASHINGTON, Dec. 19—More than 17,000 acres have been plowed, 2500 acres cultivated, 5000 acres grubbed and 4300 acres harrowed in Scotland as a result of the use of farm tractors during the last season, according to a Commerce report.

Steam trucks used before the war by a sugar refinery, employed behind the lines since 1914 and now offered for sale

Petroleum Demand Will Increase

Mining Engineers Told of Necessity for Extensive Investigation and Development

WASHINGTON, Dec. 21—The demand for petroleum, increased during the war times, will continue and grow in the future, and to meet the requirements and maintain its place as a petroleum producer, the United States must carry on extensive work in the improvement of producing, storing and shipping and refining of petroleum, and must develop every possible resource.

These were the most important messages given to the American Institute of Mining Engineers at its first annual meeting held here this week, by Chester Naramore, Chief of the Petroleum Division, Bureau of Mines, Department of the Interior. Mr. Naramore, who has just returned from a visit of several months to Europe, where he aided the Allies to secure sufficient petroleum, stated that for the past several years the United States has produced 65 per cent of the world's crude petroleum, reaching 335,000,000 bbl. in 1917, an amount equal to 60 per cent of the total world's yield. In 1917 Russia was our nearest competitor with a production of 14 per cent, while Mexico, considered the bonanza of the oil world, produced but 11 per cent.

Should Invest in Foreign Fields

Tanker tonnage, said Mr. Naramore, gained 50 per cent since the first months of 1917 with a total dead weight of 1,360,000 tons on Nov. 15, 1918. And this, he stated, is fortunate because there will be an increased demand for gasoline and lubricants for internal combustion engines both at home and abroad.

American producers and American capitalists, said Mr. Naramore, must invest capital in other sections of the globe, must develop oil wells wherever they exist, and in that way only, he stated, can they hope to meet the huge demand that will come in the future and, further, in that way only can they hope to maintain and increase the tractor, truck, passenger car, airplane and oil burning boat industries of the United States.

He holds out but little hope of securing oil from oil shale, principally because of the high cost of extraction, and insists that "this country must in the future depend upon foreign fields to meet a considerable part of the demand that will be made."

"As a source of power," stated Mr. Naramore, "petroleum functioned in all the important mechanical contrivances that stand out as factors of the war, on land, water or in the air. Eliminate petroleum and you eliminate the submarine, the fast destroyers, the best battleships, the automobile, the tractor, the motor ambulance, the motor truck and the aircraft. The airplane, the submarine and the tank each stands forth clearly in the average man's picture of recent great events, but to those whose duty it was to supply the fuel it is clearly evident that the humble motor truck functioned to an extent not measurable in any but superlative terms.

"Trucks, trucks, and more trucks, ever present from the channel ports to the Adriatic, constituting a main artery that carried the life blood of the army, whether in men, munitions or supplies.

"But how does that apply in a paper on petroleum and reconstruction problems? Tremendously—because it means when the troops return the greatly increased use of the motor truck for every conceivable future transport problem both in Europe and America; yes, and in South Africa and Australia.

"This leads directly to the third point under discussion, that is, the probable future requirements of petroleum products, as well as the possibilities of meeting them.

"Previous to the war, apparently the only limit to the number of motor cars absorbed by the public was the number which the automobile industry could build. The motor truck, on the other hand, had proved its worth most conspicuously in our commercial centers; the millions of men across the sea who represent the best blood of each nation have become accustomed to depending upon the long trains of motor lorries for their every want. Accordingly, when they return home they will automatically think of transport problems in terms of truck loads as well as tons.

Truck Demands Good Roads

"Consider this universal use of trucks with the unrestricted manufacture of automobiles, and the problem from an engineer's point of view becomes one of unlimited road building. Good roads, with permanent bridges and new regulations as to road maintenance and repair, must materialize. In fact, it means a complete revolution in the attitude of many communities toward expenditures for roads that will stand the traffic wear of fast moving 4 and 5-ton (and even larger) trucks. Many of the so-called permanent highways, of which certain states are so justly proud, are permanent only in a relative sense, and even though they represent expenditure of millions they will not be found serviceable for severe freight transport. I will let your fancy picture the further problems immediately ahead in the fields of engineering, financing and maintenance.

"Tractors are merely another branch of the one great field of automotive endeavor and their more extensive use is an assured fact. Their successful adaptation to farm use will spread with increasing rapidity as the knowledge of the internal combustion motor becomes more and more general.

"To guarantee the perpetuation of the several tremendous industries in which the internal combustion motor functions, including automobile trucks, tractors, motor boats and aircraft, an unlimited supply of petroleum is a basic necessity, and to further guarantee the life of the above industries a campaign for the conservation of petroleum products should be continued and needless losses should be prevented.

"The popular conception that there will be a permanent decrease in the demands of petroleum after the signing of peace is erroneous. Bear in mind for a moment that in France and England for the past year every gallon of gasoline used has been for war purposes, and every day was a gasolineless day. With the lifting of this ban undoubtedly any surplus of gasoline will be readily consumed by the civilian population. We are at once confronted with the problem, How will the industry meet the future demands for petroleum? A great many men have predicted in the past that each year the maximum production would be reached, and it seems very obvious to those who are close students of the game that we cannot expect any material increase in production over that of the present year, 1918. To our best knowledge, outside of northern Texas, certain parts of Oklahoma and Wyoming, the oil fields of the United States have been explored to a very large extent. Optimistically assume that the production will remain constant for the next several years, and assume that consumption will not increase for the next few years. How then will we make up the deficit of 52,000,000 bbl. as of 1917, 21,000,000 bbl. of which were drawn from storage and 31,000,000 bbl. imported from foreign fields, chiefly Mexico?

Extensive Research Work Essential

"With such a shortage and no probable increase in home production, it is very evident that to meet the shortage we must first of all obtain from petroleum a maximum recovery and a minimum loss. Extensive research work should be carried on in order to improve the art of producing, storing, shipping and refining of petroleum and to develop possible unknown and better uses of this wonderful natural resource that it might still further serve mankind.

"It has been suggested by a great many writers that oil shale will solve the problem of the world's demands, but we should bear in mind that this industry is in a decidedly experimental stage with need for extensive research work. The solution is not a simple one when we consider that on a basis of a barrel of oil to a ton of shale, 1000 bbl. of crude oil output per day requires on the roughest kind of an estimate an initial investment of approximately $1,000,000. It is primarily a moneyed man's undertaking and with such heavy initial expense its development will be very slow. Hence we cannot look upon the oil shale industry as a solution of our nation's needs within the next few years. This industry has its place, of course, in the American problems and I do not intend to minimize in any way the attention that should be given to development of oil shale.

"In spite of our very best efforts for conservation and a maximum recovery from the oil produced, it is very evident that this country must in the future depend upon foreign fields to meet a considerable part of the demand that will be made.

"Moreover, because of the universally recognized importance of petroleum as a prime factor of national defense, we must expect every first-class nation to endeavor to control as much crude production as possible, in order that they may be less dependent upon the United States. In view of this, I would consider it little less than a national calamity if American capital should fail to develop the potential petroleum resources contiguous to the Gulf of Mexico, the Caribbean Sea and those of South America.

"The control of the crude oil production of the world is often thought of as a battle between giant corporations, one in America and the other a Dutch-British unit, but the control means more than division of profits between rival business concerns. It means fuel, and fuel is power, and national security as well as prosperity.

"It is true that our domestic production has been able to supply two-thirds of the world's consumption, but petroleum is a wasting resource, and in this country because of its accessibility and proximity to industrial centers we have already drawn heavily upon our total supply as we approach the dawn of a tremendous era of petroleum expenditure.

"With the facts as outlined in my earlier remarks thoroughly known and appreciated by the powers of Europe, it will indeed be surprising if every encouragement is not furnished the different representatives of the petroleum industry by their respective governments to extend their holdings the world over. This assistance may even assume the form of active government investment in petroleum reserves.

"Accordingly, with American interest thoroughly intrenched in the prolific fields of Mexico, it is to be earnestly hoped that they will not find it necessary to sell to foreign capital, but will be able to further increase their holdings in these fields, which are so accessible to the states.

"Furthermore, if the tremendous effort of this country to establish a merchant marine is to bear its maximum rewards, the ships must be provided with oil from nearby sources to reduce the long haul cost. To this end it would be well if American capital did not limit its activity to this hemisphere, but participated in exploration and development work even to more distant parts of the globe.

"Nationally speaking, it is a question to ponder over, when one considers that American geologists are locating prospective fields and American drillers are developing petroleum reserves the world over FOR FOREIGN CAPITAL. May I leave that one thought with you as of first importance?"

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Detroit Show March 1-8

DETROIT, Dec. 21 — Detroit's eighteenth annual automobile show will be held from March 1 to March 8. It will be given in the Crosstown Garage building, which is a new garage completed during the year and which offers the greatest amount of space yet provided for a Detroit Automobile Show. The show is staged by the Detroit Automobile Dealers' Association and owing to the fact that a better show building is now available, it is expected that the show will far exceed anything ever held in this city. The Detroit Dealers' Association has established show headquarters in the Hotel Statler with H. H. Shuart, who has managed Detroit shows for the last 3 years, in charge of the exhibition.

Transport Truck in Production

MT. PLEASANT, MICH., Dec. 23—The Transport Motor Truck Co. has entered into active production and has completed arrangements for distribution in most of the large trade centers. The company, which is headed by Milton A. Holmes, is to market a 2½-ton internal-gear drive truck equipped with a Continental engine, Eisemann magneto, Stromberg carbureter, Fuller clutch and gearset, Columbia front axle, Jacox steering gear and Prudden wheels. The wheelbase will be 150 in. and equipment is to include a Motometer and a Hub-odometer.

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Receiver for Nilson Tractor

MINNEAPOLIS, Dec. 21—The Nilson Tractor Co. has been placed in the hands of a friendly receiver at the request of its own stockholders and directors. The court has appointed M. J. Osborn, who has been general manager of the company. The receivership is a temporary matter and is the first step in a refinancing and reorganization plan from which the company hopes to emerge bigger and stronger.

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Chicago Office for Lancaster

CHICAGO, Dec. 21—The Lancaster Steel Products Co. has opened a western office in the United Motors Building at 2715 South Michigan Avenue. Frank N. Adgate, who has been connected with the mills at Lancaster, Pa., has been placed in charge of this office.

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Willard Opens Boston Branch

BOSTON, Dec. 22—The Willard Storage Battery Co., Cleveland, has opened a branch at Boston to cover the New England territory. It has leased a portion of the large Garford building on Commonwealth Avenue, and has sent J. J. Kennealy, one of the factory officials, on to take charge of the plant.

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Turner Tractors for Italy

MILWAUKEE, Dec. 23—The Turner Mfg. Co., Port Washington, Wis., manufacturer of the Turner-Simplicity tractor, has booked an order for several hundred machines for exportation to Italy. It will require 100 flat cars to ship the order from the factory to the seaboard. The plant is now working on the contract, which will require several months to fill.

La Crosse May Add

LA CROSSE, WIS., Dec. 23—It is reported that the La Crosse Tractor Co., La Crosse, Wis., manufacturer of the Happy Farmer tractor, is contemplating an important plant enlargement project, involving about $100,000 in buildings and machinery.

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Perfex Radiator to Build

RACINE, WIS., Dec. 23—The Perfex Radiator Co., Racine, Wis., manufacturing motor car, truck and tractor radiators and cooling systems, intends to start work shortly on its new $100,000 plant in Racine, which project has been delayed by war conditions. The company has been cramped for room for a long time and its present orders largely exceed the capacity.

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Current News of Factories

Notes of New Plants—Old Ones Enlarged

Maibohm Will Rebuild

RACINE, WIS., Dec. 23—The Maibohm Motors Co., which suffered a heavy loss by fire in its plant recently, is making arrangements to build a new factory costing about $100,000 without equipment. The main building will be 80 x 600 one story high, of steel and brick construction, with steel sash. The contract probably will be awarded to the Austin Co., Cleveland.

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Gehl Increases Facilities

MILWAUKEE, WIS., Dec. 23—The Gehl Bros. Mfg. Co., West Bend, Wis., manufacturing gas engines, tractors and agricultural machinery, is increasing its manufacturing facilities about 25 per cent. A second floor has been added to the erecting shop for office purposes. The former office and storehouse have been converted into a machine shop addition.

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Can Export Rubber Goods

WASHINGTON, Dec. 23—Restrictions upon the exportation of manufactured rubber goods have been removed and licenses will now be issued freely.

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Embargo on Importation Into India Withdrawn

WASHINGTON, Dec. 20—The embargo on the importation into India of automobiles, motorcycles and accessories has been withdrawn. The Government of India has given official notification of this withdrawal.

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Triple Tread To Start

MILWAUKEE, WIS., Dec. 2—The Triple Tread Tire Co., Chicago, an Illinois corporation, with a capital stock of $362,236, has filed articles and a statement to do business in Wisconsin. The local headquarters are in Platteville, Wis., and the Wisconsin interest is given as $25,000.

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Dividends Declared

Ajax Rubber Co., quarterly, $1.50.

Packard Motor Car Co., quarterly, 1¾ per cent preferred stock.

Pierce-Arrow Motor Car Co., quarterly, 2 per cent preferred stock.

Newman to Bring Out Truck Line

ST. LOUIS, Dec. 23—Harry Newman, Inc., a truck and trailer distributer here, will on Jan. 15 begin production of a standard truck in five sizes, ranging from 1 to 5 tons. He has contracted for such parts as Timken-Detroit worm drive rear axle, Continental Red Seal motor, Stromberg carburetor, A. O. Smith frame, Borg & Beck clutch, and Gemmer steering apparatus. He has obtained factory space necessary for a large output. The trucks will sell from $1,590 to $4,190.

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Fansteel Moves New York Office

NEW YORK, Dec. 21—The Fansteel Products Co., North Chicago, has relocated its New York headquarters in the Park Row Building, 15 Park Row.

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Philadelphia Office for Hess

BALTIMORE, Dec. 21—The Hess Steel Corp. has established a branch office at 517 Widener Building, Philadelphia. Charles O. Rowe, district representative, will be in charge.

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Northern Foundry Increases Capital

MARINETTE, WIS., Dec. 23—The Northern Foundry Co., Marinette, Wis., organized a year ago to specialize in gray iron castings for the automotive industry, has increased its capital stock from $25,000 to $95,000. The company is completing enlargements which will double the capacity. Besides erecting an addition, it has taken over the plant of the Landover Motor Truck Co., Marinette, and this concern has taken new quarters at Stephenson and Liberty streets. At the annual meeting of stockholders, the Northern company re-elected these officers: President and general manager, J. M. Fitzpatrick; vice-president, Patrick McManus, Milwaukee; secretary, Edward J. Vanderboom, Milwaukee; treasurer, Louis E. Best, Milwaukee.

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Open New Brass Foundry

SUPERIOR, WIS., Dec. 23—A new brass foundry has been opened at Superior, Wis., by G. W. Nelson, formerly engaged in this business at Cumming Avenue and Second Street in this city. Nelson has leased the plant until recently occupied by the Acme Foundry Co., which is now located in its new shops.

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Air Mail Service in New Zealand

WASHINGTON, Dec. 23—An aerial mail service will be established shortly in New Zealand from Auckland to Dunedin, a distance of 700 miles, according to a Commerce Report. It is expected that a saving of 14 hours will be effected.

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Export Conservation List Modified

WASHINGTON, Dec. 23—The War Trade Board has modified its export conservation list, removing among other commodities, airplane duck cotton and rubberized silk for use in aircraft manufacture.

Williams Again Heads Highways Industries Association

CHICAGO, Dec. 21—S. M. Williams of the Garford Motor Truck Co., was re-elected president of the Highways Industries Association at the annual meeting held here last Friday. Other officers elected were: First vice-president, G. P. Coleman, chief engineer, Highways Department, West Virginia; second vice-president, E. J. Mehren, editor, Engineering News-Record; third vice-president, Charles J. Lang; secretary and treasurer, H. G. Shirley; directors (Class A membership), W. P. Blair, National Paving Brick Association; A. T. Rhode, Granite Pavement Block Manufacturers' Association; E. J. Mehren, National Association Asphalt Block Manufacturers; W. T. White, N. A. C. C.; directors (two years), W. E. Metzger, E. J. Sutton, A. P. Sandles, Philip Koehring; directors (three years), H. J. Love, W. O. Rutherford, A. N. Johnson, S. F. Beatty. David S. Ludlum, president of the Autocar Co., Ardmore, Pa., was elected to Class B membership. The following national associations have made application for Class A membership: National Vitrified Pipe Manufacturers' Association, the Lime Association.

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M. Frankel, manager of the Chicago office of the Roller-Smith Co., maker of electrical instruments, has been promoted to assistant sales manager of the company, with headquarters at Chicago.

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G. W. Werden has been appointed export manager of the Denby Motor Truck Co., Detroit. He has established headquarters in New York City.

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H. W. Clark has been appointed manager of advertising for the Chicago Pneumatic Tool Co., Chicago. He was formerly in the advertising service department of the McGraw-Hill Publishing Co. in Chicago.

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Government Help For Aviation

(*Continued from page* 1110)

Both the balance and the dynamometer will be suspended from an overhead platform into the wind stream. In each case the observer will work above the platform. Power will be supplied to the wind tunnel propeller by a 250 hp. motor, which will be operated by a 250 kw. synchronous motor generator set with special arrangements for speed control and regulations.

The wind tunnel is designed for air velocities up to 130 m.p.h. with the 5 ft. section and 200 or more miles per hour when using the 30 in. section.

During the past year the committee has served the War and Navy Departments as an impartial agency for the settlement of disputes between contractors and the departments. Among the more prominent cases handled were:

A dispute between the War and Navy Departments on one hand and the Kessler Motor Co. relative to compliance with technical provisions of a contract for development of experimental aircraft engines.

The contract with the Glenn L. Martin Co. for a large bombing plane with a smaller pilot plane fastened to it so as to automatically control the large plane and direct its course after the smaller pilot plane had been released, the larger plane to carry and automatically release a large bomb of the type invented by Lester P. Barlow. A contract had been completed at an expenditure of $15,000 and a controversy arose over the advisability of expending an additional $150,000. The committee advised against it.

Sand loading and other tests made by members of the committee's technical staff on an experimental plane built by the Carolina Aircraft Co. revealed the ability of wood veneer in wing construction not only for ribs but also for the actual wing covering. It was found that the internal drift wires may be eliminated and the same weight per square foot of service obtained as in the ordinary wing. This was reported promptly to the Bureau of Aircraft Production.

Engine fuel investigations during the year have included inquiries into:

1—Gasoline direct from crude petroleum without sills, cleaned without use of acid or alkali.
2—First distillate of crude benzine cleaned and purified without the use of acid or alkali.
3—Natural neutral gasoline.
4—Increased yield of straight paraffin gasoline from crude oil.
5—Separation of gasoline from crude oil by mechanical means.
6—Quality samples of pure paraffin gasoline from crude oil were completed and delivered in July, 1918, and were referred to the Bureau of Standards for tests. This work will be described in detail in a later report.

The membership of the committee as elected on Oct. 10, 1918, includes Dr. John R. Freeman, chairman; Dr. W. F. Stratton, secretary; Dr. Charles D. Walcott, chairman executive committee; Dr. Joseph S. Anes, Dr. William F. Durand, Dr. John F. Hayford, Major General William L. Kenly, Prof. Charles F. Marvin, Dr. Michael I. Pupin, Dr. Wallace C. Sabine, Rear Admiral David W. Taylor, U. S. N.; Commander John H. Towers, U. S. N. The committee is divided into an Executive Committee and sub and special committees. The subcommittees include those for:

Aircraft Design and Associated Engineering Problems.
Steel Construction for Aircraft.
Fireproof Coverings.
Navigation of Aircraft, Aeronautic Instruments and Accessories.
Power Plants for Aircraft.
Fuel Injection Engines.
Standardization and Investigation of Materials for Aircraft.
Light Alloys.

Special committees are on aero torpedos, aircraft communication on airplane mapping, aeronautic bibliography, buildings, laboratories and equipment, civil aerial transport, design, construction and navigation, editorial, free-flight tests, Government relations, direct-lift aircraft, aeronautic nomenclature, personnel, relation of atmosphere to aeronautics, engineering problems.

Following is a list of special publications which will be issued in the near future by the committee:

24—Air Flow Through Poppet Valves.
25—Nomenclature for Aeronautics.
26—The Variation of Yawing Moment Due to Rolling.
27—Behavior of Airplanes in Gusts, III.
28—The Laws of Air Resistance of Aerofoils.
29—General Theory of the Blade Screw.
30—Experimental Research on Air Propellers, II.
31—Accuracy and Efficiency of Pressure Nozzles.
32—An Airplane Tensionmeter.
33—Luminous Materials.
34—Aluminum and Its Light Alloys.
35—The Strength of One-Piece, Solid, Built-up, and Laminated Wood Airplane Wing Beams.
36—The Structure of Airplane Fabrics.
37—Fabric Fastenings.
38—Airplane Dopes and Doping.
39—The Testing of Balloon Fabrics.
40—The Ferrosilicon Process for the Generation of Hydrogen.
41—Testing the Balloon Gas.
42—A New Process for the Production of Aircraft Engine Fuels.
43—Properties of Aerofoil Sections.
44—Description of Altitude Laboratory.
45—Effect of Compression Ratio. Pressure, Temperature, and Humidity on Power.
46—Heat Distribution in an Aircraft Engine.
47—Power Characteristics of Fuel for Aircraft Engines.
48—Carbureting Conditions Characteristic of Aircraft Engines.
49—Metering Characteristics of Carbureters.
50—The Junkers-Diesel as an Aircraft Engine.
51—Spark Plug Defects and Tests.
52—Temperatures in Spark Plugs Having Brass and Steel Shells.
53—Properties and Preparation of Ceramic Insulators for Spark Plugs.
54—Effect of Pressure and Temperature on the Sparking Voltage.
55—Oscillograph Tests of Ignition Systems.
56—Heat Energy of Various Ignition Sparks.
57—The Series Gap as a Means for Improving Ignition.
58—Transformation Ratio and Coupling in High Tension Magnetos.
59—General Analysis of Airplane Radiator Problems.
60—General Discussion of Test Methods for Radiators.
61—Head Resistance Due to Radiators.
62—Effect of Altitude on Radiator Performance.
63—Water Flow Through Radiators.

Men of the Industry

Changes in Personnel and Position

Stewart-Warner Engineer Dies

CHICAGO, Dec. 21—John E. Genn, chief engineer of the Stewart-Warner Speedometer Corp., died Dec. 15. He had been connected with the company since its infancy; in fact, was one of its first ten members. He has been successively engineer, assistant chief engineer, chief inspector and chief engineer. He was 35 years old.

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John F. Reno, chief engineer of the Root & VanDervoort Engineering Co., East Moline, Ill., died Dec. 19 of pneumonia following an attack of Spanish influenza. Mr. Reno first became connected with the Moline Automobile Co. about twelve years ago and when this company was absorbed by the Root and VanDervoort Co. he continued as chief engineer. He was thirty-five years old.

Mail Trucks Earn Four Times Their Cost

Cost of Operation Between July 1 and Sept. 30 Was $70,000, as Compared with $292,000 Revenue—Post Office to Put 2000 Trucks on 600 Routes

WASHINGTON, Dec. 21—Motor truck mail service costs during the year ended June 30, 1918, were from 30 cents per hour to $1.26 per hour, depending on the truck and the locality, according to a tabulation of motor truck costs filed by the Post Office Department with the Committee on the Post Office and Post Roads.

The costs varied considerably with the different types and capacities of trucks and again with the localities. For example, a Ford operated in Boston cost 40 cents per hour, in New York 81 cents per hour, and in Washington, D. C., 36 cents per hour. A ¾-ton White in Boston cost 59 cents per hour, in Nashville 36 cents per hour, in Philadelphia 98 cents per hour, and in Washington, D. C., 49 cents per hour.

509 Fords Used

Depreciation and interest rates per annum figured on 16-hour days and 365 days a year range from 20 per cent to 33 1/3 per cent. More Ford trucks are in the mail service than any others, totaling 509 as compared with 173 ¾-ton White trucks, and, next, 64 Packard 1½-ton trucks.

Thirty-one through motor truck routes have been established over 5720.61 miles. The cost of operation for 3 months from July 1, 1918, to Sept. 30, 1918, was $69,625.75 as compared with a total revenue of $292,024.95. These figures in additional tables were filed with the Committee on the Post Office and Post Roads by Fourth Assistant Postmaster General James I. Blakeslee to prove the need for the $1,000,000 appropriation for additional motor truck routes.

Blakeslee stated that the net income totaled $134,791.72 if the 1-cent war tax was deducted, and in addition 33 1/3 per cent should be credited to postal operations other than perfected through the motor truck service, leaving an actual net income in 3 months of $89,861.15, or $1,576.51 per route per month, or a net income of $18,918.12 per route per annum. The plans of the Post Office are to establish 2000 trucks over 600 routes.

In illustration of the service that motor truck routes had given, Blakeslee stated that on Nov. 13, 1918, 795 lb. of milk was hauled from Frisco, Mo., to Warsaw, Mo. "Points you might say," stated Blakelsee, "of nowhere to nowhere—there is no market at Warsaw, it is a town of no size and Frisco is a village. There is no railroad anywhere in the vicinity of either of these villages." He also stated that 1726 lb. of milk were carried into Washington, D. C., daily by motor trucks.

A "B" type standardized army truck turned over by the War Department, he said, is now operating between Philadelphia and Westchester, Pa., carrying 6000 lb. of mushrooms a trip. Motor truck operators are being paid $4 a day for the first 6 months, $4.50 a day for the next 18 months, and $5 daily thereafter. It would require $8,794,000 to operate 600 routes with 2000 trucks, said Mr. Blakeslee.

Replies received from 88 postmasters showed increases of one-half of 1 per cent to 500 per cent of postal business due to the establishment of motor truck routes.

Following is the table showing the cost of motor service by districts:

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Substitute for Platinum

WASHINGTON, Dec. 19—A substitute for platinum has been found in the manufacture of sulphuric acid, according to announcement made by the War Industries Board here to-day. The discovery was the result of experiments in the Nellen Institute, Pittsburgh. The exact nature of the substitute has not been revealed. The substitute is not available to take the place of platinum in the arts or in dentistry, but it may be used later, according to the report, for laboratory and jewelry purposes.

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Oil and Lubricants Purchased

WASHINGTON, Dec. 19 — From April 1 to Nov. 1, 1918, the Oil Branch of the Raw Materials Division of the United States Army purchased $23,809,584.14 worth of oils and lubricants. This included 111,229,400 gal. and 2,016,076 lb. Some of the principal items purchased and the quantities are as follows:

Article	Gallons	Value
Liberty aero oil	1,308,540	$808,183.66
Lubricating oil, light	141,375	54,699.49
Lubricating oil, medium	826,544	329,860.61
Lubricating oil, heavy	619,498	271,597.23
Transmission lubricant	286 570	92,975.63
Aviation gasoline	12,066,414	3,060,119.48
Aviation naphtha	3,297,500	1,084,666.25
Fighting naphtha	4,021,500	1,657,713.75
Motor gasoline	52,374,066	11,885,012.84
Mineral oil	1,868 931	298,789.55
Axle grease	1,034,343	279,508.14
Fuel oil	30,984,134	2,195,463.12
Motorcycle oil	166,600	87,601.36
Neatsfoot oil	56,005	118,611.25
Neatsfoot oil substitutes	252,500	174,720.00
Road oil	652,350	47,479.20

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Indian Service Wants 3½ Ton Truck

WASHINGTON, Dec. 21—The United States Indian Service, Department of Interior, has asked for bids on 1 3½-ton truck, worm drive with a steel dump body and hoist. Capacity 7000 lbs., positive pump circulating oil system in combination with constant level splash system, artillery type wood wheels, Timken roller bearings, 36 by 5 single front tires and 40 by 5 dual rear tires are specified. The truck must be fully equipped with lights and tools and the seat frame should be of wood with well ironed and upholstered back and spring upholstered cushion. All bids should be accompanied by specifications and cut of the truck and should be sent to the Asylum for Insane Indians, Canton, South Dakota, no later than Jan. 4, 1919.

Revenue and Operating Cost of Postal Trucks, July 1 to Sept. 30, 1918

Termini	July Revenue	July Cost	August Revenue	August Cost	September Revenue	September Cost	Total Revenue	Total Cost
Portland, Worcester	$6,807.71	$1,458.67	$14,751.44	$1,502.60	$16,000.82	$1,467.01	$37,595.97	$4,428.28
Worcester, New York	7,070.20	1,875.47	13,000.00	1,893.89	13,477.22	1,940.47	34,229.47	5,709.83
Kennett Square, Philadelphia, Flemington	4,674.95	2,423.90	4,271.57	1,926.23	3,530.45	1,395.90	12,476.97	5,746.03
Lancaster, New York	3,131.23	1,587.44	2,594.08	1,357.19	2,875.25	1,772.28	8,600.56	4,716.91
Kennett Square, Wilmington	4,123.68	2,397.68	4,055.97	1,095.57	6,282.49	1,038.55	14,462.14	3,533.20
Philadelphia, Washington	13,627.19	2,397.68	13,000.00	2,006.19	14,758.27	2,249.16	42,018.15	6,653.03
Washington, Gettysburg, McConnelsburg	3,892.56	1,306.81	3,914.15	972.13	4,335.02	1,145.17	12,141.73	3,424.11
Baltimore, Gettysburg, Lancester	5,600.25	1,224.36	5,594.80	954.33	5,487.87	841.83	16,682.92	3,020.52
Baltimore, Solomons, Berryville	16,441.67	2,177.59	17,134.82	2,552.16	14,784.37	1,908.37	48,360.86	6,638.12
Washington, Winchester	4,050.49	1,471.66	4,809.89	1,443.04	3,926.32	744.47	12,786.65	3,659.17
Washington, Rock Point, Ridge	6,820.00	1,372.21	7,674.44	1,112.14	7,271.16	1,210.59	21,765.60	3,694.94
Columbia, Orangeburg, Augusta	517.04	514.61	1,158.41	1,202.71	1,323.17	1,063.12	2,998.62	2,780.44
Augusta, Statesboro, Savannah	525.44	558.65	970.08	1,105.23	408.50	580.55	1,904.03	2,244.43
Statesboro, Dublin, Fort Valley	49.08	136.27	738.77	1,289.27	194.27	623.04	982.12	2,048.58
Columbus, Zanesville	1,151.05	544.35	1,102.46	577.63	1,031.02	560.00	3,284.43	1,681.90
Atlanta, Dahlonega	.....	.....	172.31	244.64	551.30	489.89	723.61	734.53
Indianapolis, Bedford, Louisville	.....	.....	3,168.94	1,167.78	6,548.54	1,288.09	9,717.48	2,455.87
Indianapolis, Versailles, Cincinnati	.....	.....	1,599.12	1,069.54	4,304.85	1,325.64	5,903.97	2,395.18
Cincinnati, Hilisboro, Columbus	.....	.....	798.70	649.49	1,147.35	1,173.54	1,946.05	1,823.03
Cincinnati, Lexington	.....	.....	.....	.....	73.13	127.57	73.13	127.57
Louisville, Lexington, Bardstown	.....	.....	.....	.....	545.04	305.19	545.04	305.19
Springfield, Warsaw, Marshall	.....	.....	.....	.....	1,377.86	1,427.02	1,377.86	1,427.02
Nashville, Bardstown	.....	.....	.....	.....	1,486.49	377.79	1,486.49	377.79
Total	$78,482.54	$20,448.75	$101,821.65	$24,121.76	$111,720.76	$25,055.24	.....	.....
Grand total	.....	.....	.....	.....	.....	.....	$292,024.95	$69,625.75

Progressive Construction in the Naval Aircraft Factory, Philadelphia

The original manufacturing unit of the Naval Aircraft Factory, Philadelphia, with a ground area of 160,000 sq. ft., is a permanent steel structure of imposing dimensions. It was built and equipped in about 3 months at a cost of $1,000,000. It has more than 3600 workers, both men and girls, and soon after the factory had produced its first service machine, it began to maintain an output of four a day.

Nearly every feasible suggestion has been worked out and improvements made wherever possible and all this has resulted in the special seaplane model finally developed at League Island—the Model F, deemed the peer of any of the American machines in the war. It has a wingspread of 100 ft., driven at the rate of 100 m.p.h. by two Liberty engines. The propellers are 10½ ft. in diameter. It carries several bombs, a number of machine guns fired from bow and stern, has a wireless and a telephone system and is supplied with carrier pigeons and a crew of four men.

Salvage Division Formed

WASHINGTON, Dec. 21—The Salvage Division of the army has been directed by Brig. Gen. R. E. Wood to take charge of all unserviceable or used Government supplies and materials which result from the demobilization of the military forces and are to be sold. This property includes material that cannot be repaired or reclaimed and made serviceable to the army, and second-hand materials which have been used and cannot be sold to better advantage or be repaired. The Salvage Division will determine the method by which sales will be made and the conditions upon which bids will be received. All bids, however, will be accompanied by a guaranty deposit of at least 20 per cent of the amount bid either in cash or certified check. No delivery of property will be made until the full purchase price is paid. A Governing Sales Board on Unserviceable Property will be appointed to act as a Board of Review with regard to sales of unserviceable property.

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Commerce Department Takes Over War Sections

WASHINGTON, Dec. 21—The Resources and Conversion Section and the Conservation Section, both divisions of the War Industries Board, are to be taken over by the Department of Commerce after Jan. 1, 1919. The Resources and Conversion Section, which has compiled much valuable information about raw materials and plant facilities, will be continued temporarily. The Conservation Section, which was first known as the Commercial Economy Board, will be made a permanent division of the Department. The Conservation Section has been instrumental in effecting economies in various industries by elimination of unnecessary types, models and styles of commodities. It is the Government division that arranged for the reductions in the sizes and types of passenger car and truck tires and in the types of farm plows.

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Tractor Agency Wanted

WASHINGTON, Dec. 21—The Bureau of Foreign and Domestic Commerce, Department of Commerce, has a request from France for an agency for tractors. Further information can be had by addressing Foreign Trade Opportunity No. 27829. Another inquiry on hand is for an agency for automobile tires in Australia. Further information can be had by addressing Foreign Trade Opportunity No. 27828.

Calendar

ENGINEERING

S. A. E. Meetings

1919

Jan. 8—Minneapolis Section, S. A. E.—Hotel Radisson. "Governors for Tractors and Truck Engines."

Feb. 4-6—New York. Winter Meeting. Society of Automotive Engineers, Engineering Societies' Building.

Feb. 6—Victory Dinner, Hotel Astor, New York.

Feb. 5—Minneapolis Section, S. A. E. — Hotel Radisson. "Radiator Cooling Fans."

March 5 — Minneapolis Section, S. A. E.—Hotel Radisson. "Tractor Service and Sales."

April 2—Minneapolis Section, S. A. E. — Hotel Radisson. "Implements Designed for Tractor Belt Power and Their Characteristics."

MOTOR SHOWS

Jan. 11-18—Los Angeles, Cal. Automotive Exposition.

March 1-8—Detroit, Mich. Detroit Automobile Dealers' Assn. H. H. Shuart, Manager.

Jan. 24-30 — Milwaukee, Wis. Eleventh Annual, Milwaukee Automobile Dealers, Inc., Auditorium. Bart J. Ruddle, Manager.

Jan. 25-Feb. 1—Chicago. Passenger cars, Coliseum.

February—Grand Rapids, Mich. Grand Rapids Automobile Business Assn. E. T. Conlon, Manager.

Feb. 1-15—New York. Automobile Dealers' Assn. Charles A. Stewart, Manager, Hotel Woodward, Broadway and 55th St.

Feb. 3-5 — Chicago. Trucks, Coliseum.

Feb. 15 - 22 — Louisville, Ky. Louisville Auto Dealers' Assn.

Feb. 15-22—Newark, N. J. N. J. Auto Exhibition Co. Calude Holgate, Manager.

Feb. 15-22—Minneapolis, Minn. Minneapolis Auto Trade Assn. Walter B. Wilmot, Manager.

Feb. 17-22—Des Moines, Iowa. Tenth Annual, Des Moines Automobile Dealers' Assn. C. G. Van Vliet, Manager.

Feb. 15-22—Albany, N. Y. Albany Automobile Dealers' Assn. State Armory.

Feb. 17-24 — Passenger Cars; Feb. 24-27, Trucks—South Bethlehem, Pa. Lehigh Valley Auto Shows Co. J. L. Elliott, Manager.

Feb. 24-March 1—Kansas City, Mo.—Kansas City Motor Dealers' Assn. E. E. Peake, Manager.

March — Great Falls, Mont.—Montana Automobile Distributers' Assn.

March—Philadelphia, Pa. Philadelphia Automobile Trade Assn. Passenger cars.

Mar. 3-8—Columbus, O. Columbus Automobile Show Co., Memorial Building. W. W. Freeman, Manager.

March 3-8—Buffalo, N. Y. Buffalo Automobile Dealers' Assn.

March 1-10—San Francisco, Cal. Motor Car Dealers' Assn. G. A. Wahlgreen, Manager.

March 10-15—Syracuse, N. Y. Syracuse Automobile Dealers' Assn. Harry T. Gardner, Manager.

Second or third week March—St. Louis, Mo. St. Louis Auto Mfrs. & Dealers' Assn. Robert E. Lee, Manager.

March 15-22 — Boston, Mass. Boston Automobile Dealers' Assn. Chester I. Campbell, Manager.

March 22-29, Passenger Cars; April 1-5, Trucks—Brooklyn. Brooklyn Motor Vehicle Dealers' Assn. I. C Kirkham, Manager.

Third week March—Trenton, N. J. Trenton Auto Trade Assn. John L. Brock, Manager.

March—Pittsburgh. Automobile Dealers' Assn. of Pittsburgh. John J. Bell, Manager.

March—Utica, N. Y. Utica Motor Dealers' Assn. W. W. Garabrant, Manager.

Feb. 15-22 — Cleveland, Ohio. Cleveland Auto Show Co. Fred H. Caley, Manager.

April 5-12—Montreal, Can.—National Motor Show of Eastern Canada, Victoria Rink. T. C. Kirby, Manager.

Not decided—Bridgeport, Conn. Auspices of City Battalion. B. B. Steiber, Manager.

Not decided — Harrisburg, Pa. Harrisburg Motor Dealers' Assn. J. Clyde Myton, Manager.

Not decided — Hartford, Conn. Hartford Automobile Dealers' Assn.

Not decided—Indianapolis, Ind. Indianapolis Auto Trade Assn. John B. Orman, Manager.

Feb. 10-15—Kansas City, Mo. Kansas City Motor Dealers' Assn. E. E. Peake, Manager.

TRACTOR SHOWS

Feb. 10-15 — Kansas City, Mo. Fourth Annual Tractor Show. Sweeney Building, Kansas City Tractor Club. Guy H. Hall, Sec.

Feb. 18-22—Wichita, Kan. Annual Mid-west Tractor and Thresher Show, Wichita Tractor and Thresher Club. Forum.

CONVENTIONS

Dec. 30-Jan. 1—Chicago, Ill. Twelfth Annual Meeting American Society of Agricultural Engineers. J. W. Dickinson, Secretary, Ohio State University, Columbus.

Feb. 4-6—New York. Meeting, Society Automotive Engineers.

Feb. 25-28 — New York. Sixteenth Annual Convention, American Road Builders' Assn.

Cultivating the Chinese Automotive Field

(*Continued from page* 1107)

equal number of persons at any other place in the world. Then there are the Chinese, the number of whom able to buy motor cars it would be impossible to estimate. Very often you will find that a Chinese family operating one car will quickly add several more to its fleet.

Naturally in such a market there will be a variety of ideas as to the car which will definitely meet individual needs, and the methods of choosing will, of course, differ. Among the Europeans, for instance, we find that the buyer has a natural inclination to purchase a motor vehicle made in his own country, and he will usually do so, if he can secure a car that comes within his purse. The foreigner, too, before investing will make a close study of the mechanical construction of the machine and buy largely on his personal knowledge of construction, on the word of friends owning cars of the same make, or the service which the dealer can give him. The Chinese buyer, on the other hand, in nine cases out of ten pays absolutely no attention to machanical construction. He buys because he likes the appearance of the car, its color, and number of accessories. He is not trained in mechanics and shows no interest in them.

The lower-priced American cars have established themselves in every selling center of China and are now taking the bulk of the trade, but that there is a demand for higher-priced cars is borne out by the fact that a great number of European cars are operated in the larger cities. Manifestly, therefore, there is no reason why any American manufacturer cannot go after business in China with his standard car, but if his domestic product is built with left-side drive, he must furnish his cars for this territory with a steering column on the right, and magneto is preferred to battery ignition.

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Want Detroit-Cleveland Air Mail

WASHINGTON, Dec. 23—The Post Office authorities here have been requested by the Detroit Post Office to establish airplane mail service between Detroit and Cleveland. The request will be acted upon later.

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Fuel Oil Priorities Abolished

WASHINGTON, Dec. 21—All priorities in respect to fuel oil and gas oil were abolished in an order issued to-day by the United States Fuel Administration, in line with its general policy of removing all wartime restrictions as rapidly as conditions warrant.

In to-day's order, Rule 1 of an order issued Sept. 24, 1918, establishing priorities for the entire country in respect to the delivery of fuel oil and gas oil, creating 12 classes, and providing for the serving of the needs of consumers in the order named, is completely set aside. All consumers are now on an equal basis.

Hair-Line Defects in Crankshafts

(*Continued from page* 1105)

about 80,000 lb. per sq. in., the ultimate strength about 120,000 lb. per sq. in., the elongation about 15 per cent, and the reduction in area about 38 per cent.

(4) The "hair-line" on the surface has no appreciable depth.

(5) The two steels show long threads of manganese sulphide and iron oxide parallel to the direction of forging.

(6) The structure is martensitic but is streaky or laminated parallel to the forging.

(7) This lamination is due to segregation.

(8) It is the primary cause of the fibrous appearance of the fractures.

(9) The presence of the threads of manganese sulphide and iron oxide tend to make the fibrous fracture more pronounced.

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"Pirate" Part Suit Brought by Connecticut Company Settled

NEW YORK, Dec. 21—The suit in equity instituted by the Connecticut Telephone & Electric Co., Meriden, against Paul G. Niehoff & Co. alleging infringement of certain Connecticut parts through the sale of spare parts not made by Connecticut but sold for Connecticut equipment, has been settled out of court. Niehoff recognizes the validity of the Connecticut patents and has agreed not to sell "pirate" parts.

Automotive Chronology for 1918

Important Developments in the Industrial and Financial Fields Arranged According to Date of Occurrence

January

2—Three samples of Class A standardized war trucks manufactured in White, Denby and Autocar factories arrive in Washington, after drive from factories.
2—Secretary McAdoo as Director of Railroads issues order that any consignee who does not promptly unload freight cars and release them for return trips, must be embargoed.
2—J. C. Wilson Co. and Dodge Brothers announce that drive-away policy for trucks is satisfactory, and will be followed by them throughout the winter..
2—General Motors Corp. announces undivided profits of $12,900,000 for 4 months ended Nov. 30, 1917.
2—Post Office Department plans to establish from 3000-4000 miles of motor truck parcels post routes to be in operation before April 1.
5—First War Automotive Show opens at Grand Central Palace, New York.
8—Second truck train of 46 Pierce-Arrows ends trip from Buffalo to Governor's Island.
8—Exports drop 10 per cent in November.
9—S. A. E. announces the addition of 1000 new members in 1917.
10—Thirteenth annual session of S. A. E. C. F. Kettering elected president.
14—Eighteen Lansing firms allied for war work.
14—Overland profits in 1917 $8,500,000.
14—New York Rotary Motor Co. places new 3-wheel delivery car on market.
15—Petroleum output for 1917 breaks record. Supply is 341,800,000 bbl., or 14 per cent more than in 1916.
16—Proclamation issued by Fuel Administrator ordering shut-down of industry for five days from Jan. 18-22, and 10 Mondays from Jan. 21 to March 25.
18—Committee of three receivers named for Bijur Motor Lighting Co.
21—Canada registrations for 1917 show 199,302 cars and trucks. Great increase in trade and capital also recorded.
22—New altitude record made by Lieut. Brak-Papa in SIA biplane with FIAT engine.
22—Rubber Assn. of America appoints a war committee to act as a point of contact between the industry and government. B. G. Work named as chairman.
22—Collier Motor Truck Co. starts production on new ¾-ton model.
23—Reports from England show that of 490,000 cars and trucks in Great Britain approximately 80 per cent are out of commission, due to lack of fuel.
24—After 5-day shut-down, manufacturers find that the fuel situation is not greatly improved.
24—Mexico rated as second largest oil-producing country, replacing Russia.
26—National Assn. of Boat and Engine Manufacturers urge adoption of standard motor lifeboat as part of the equipment of the emergency fleet.
28—Only 124 Michigan plants, all doing government work, are exempted from the Garfield closing order.
28—Goodyear Tire & Rubber Co. inaugurates plan of selling $25,000,000 second preferred stock to service station dealers and their customers. Dealers to receive $2 per share for selling stock.
29—Fuel Administrator Garfield tells meeting of automobile men that he has no intention of curtailing the industry.
29—Federal investigations show that the average cost of producing a gallon of gasoline is only 14.9 cents exclusive of freight and sales charges.
30—Massachusetts, Pennsylvania, and New York plan the establishment of central bureaus, at which truck drivers will be assigned loads to deliver on their return.

February

2—Chicago Show closes. 150,000 attend. Interest of farmers deemed significant.
2—Chevrolet reports sales of $62,638,303 for 1917. Gain of 32 per cent over 1916.
3—Detroit tied up by shortage of gas. Between 8000 and 10,000 men laid off temporarily. Conditions acute.
5—Duesenberg buys Fiat Poughkeepsie plant. Fiat to occupy part of buildings and production of Fiat cars to go on much as usual.
5—Government orders that all fuel oil manufacturers and distributers need Federal licenses if they have gross sales of more than 100,000 bbl. a year. Priority of deliveries given out. Transportation difficulties, not an oil shortage, the cause of the ruling.
5—B. F. Goodrich Co. reports net profits of $12,675,000 for 1917; 33 per cent gain over 1916.
5—Ford Motor Co. receives government order for the manufacture of one submarine chaser a day.
5—N. A. C. C. appoints a truck committee to help the government break up the freight congestion. George M. Graham, chairman.
9—Twin Cities stage first automotive show. Unprecedented crowds attend. Tractors the best card.
9—The keel of the first of the submarine chasers being built by the Ford Motor Co. is laid.
11—National Motor Transport Co. plans a motor freight line between Detroit, Cincinnati, Cleveland, Toledo and Chicago to alleviate railroad congestion.
12—Ford Motor Co. starts production of complete Liberty engines. Will be largest single producer.
12—Post office department asks for bids for an airplane mail service, with a round trip daily between New York and Washington.
12—Master Truck Transportation Co. plans operation of a motor freight line on schedule time, between Chicago and New York.
12—Edward R. Stettinius given powers to push all war work and maintain an even flow of production. To be surveyor of industrial field and accelerator of war supplies.
13—Essex car announced by Hudson.
16—President Wilson issues proclamation regulating exports and imports. Special licenses needed for many products.
18—Buda Co. exhibits new model tractor engine at Kansas City Show.
19—Establishment of Return Load Bureaus in Connecticut of great value.
20—Chandler Motor Car Co. reports earnings of $2,382 403 for 1917.
21—First Liberty plane shipped to Europe.
23—Chevrolet company assumes status as a division of General Motors Co.
23—American delegation, headed by F. G. Diffin, reported safe in England to confer on adoption of international standards for manufacturing materials related to cars, trucks, tractors and machinery.
25—Ford shipbuilding plant on River Rouge for the manufacture of submarine destroyers.
25—Roads so improved that drive-away can be resumed in Michigan.
25—Price of Ford car increased $90, and chassis to cost $75 more.
26—Bernard Baruch made head of War Industries Board, succeeding Daniel Willard.
26—Fisk Rubber Co. announces profits of $3,578,484 for 1917, double the amount of 1916.
26—Announcement made that S. A. E. summer session will be held in Dayton, June 17 and 18.
27—Ohio War Industries Commission gives out plan whereby all Ohio factories will be co-ordinated for war work.
27—The State of Pennsylvania buys 40 tractors to put at the disposal of farmers.

March

2—Kelly-Springfield Tire Co. reports earnings of $4.323.955 for 1917, equal to 49 per cent on common.
2—Embargo placed on handling of motor cars by the railroads modified. Permits obtainable for shipments in certain areas.
2—United States Chamber of Commerce urges adoption of Return Load Bureaus throughout the country.
4—Trucks end railroad congestion in Hartford, Conn., by unloading freight cars.
4—Highway Transport Committee works out plan for rural express service from farms to cities.
5—Third annual Salesmanship Congress called in Detroit for April 24-27.
6—Washington statistics show drop of 20 per cent in January exports of cars, trucks and parts from the United States.
6—Illuminating Engineers and S. A. E. hold tests for determining headlamp glare, as well as maximum and minimum light.
6—General Motors reports earnings of $26,285,951 for 1917, equal to 34.2 per cent on common.
6—N. A. C. C. withdraws from Automobile Industries Committee and Hugh Chalmers resigns.
7—N. A. C. C. comes to agreement with Fuel Committee and War Industries Board as to passenger car production for 1918. Manufacturers agree to curtail 30 per cent.
7—England revises gas restrictions, allowing cars and trucks to receive certain amounts.
8—N. A. C. C. organizes truck division so as to give commercial vehicles more attention.
9—A. A. A. resumes control of racing in the United States. Contest board takes hold and status will be same as last November.
10—France adds 10 per cent tax to motor cars, putting them in the luxury class.
11—Ford announces that he will manufacture light tanks for the government.
11—Flint factories work out a scheme for pooling their welfare interests in cooperation with the local Y. M. C. A.
11—Curtailed schedule of production serves to clarify industry by allowing factories to make definite distribution plans.
11—The State of Michigan buys 1000 tractors for distribution among farmers, under certain restrictions.
12—Studebaker profits for 1917 show decrease of 60 per cent.
12—Peerless Truck & Motor Corp. profits for 1917 are $1,065,869, equal to 10.6 per cent on common.
14—Motor Products Corp. reports earnings of $537.527 for first year.
14—Committee appointed to investigate airplane situation. H. Snowden Marshall made chairman.
15—National Conference of Tractor Manufacturers formed in Chicago.
18—Three airplane investigations started.
20—J. I. Case Co. announces profits equal to $18 a share on common for 1917—double the 1916 amount.
20—Steel trade denies any shortage of steel which may make further curtailment of automobile industry necessary.
20—M. A. M. A. Washington office considerably enlarged. Will be distinct from N. A. C. C.
20—Stromberg Motor Devices Co. reports net profits for 1917 equal to $6.37 a share.
20—Committee appointed to fix prices of basic materials, under the authority of the War Industries Board.
22—List of 82 imports, including cars, asbestos, graphite, acids, nickel and zinc, restricted by War Trade Board.
25—Gray & Davis, Inc., which went into the hands of a receiver in November, 1916, pays all its debts.
26—Price of $875 for Fordson tractor, with plow, fixed by Michigan War Preparedness Board after consultation with Ford representatives.
26—Airplane delay rumors found to be greatly exaggerated, Washington learns.
29—The first Liberty truck convoy arrives in Baltimore after trip from Lima, Ohio. There were 20 trucks and 3 passenger cars in the train.
30—Oil Administrator Requa says that there is plenty of gasoline on hand, and the only possible shortage may arise from transportation difficulty, not from production decrease.

April

1—International Motor Truck Corp. reports earnings of $1,127,093 for 1917. Assets increase 50 per cent.
2—White Co. reports earnings of $3,800,308, approximately the same as for 1916.
2—Pierce-Arrow company earns $11 a share for 1917. Gross business increases 75 per cent over 1916.
2—Overland profits for 1917 are $3.16 a share. Net profits less than those of 1916.
2—Liberty engine commended by Marshall airplane report. Government red tape blamed for production delays.
2—Cars are taxed 10 per cent in France, thereby being placed in luxury class.
8—Requirements Division formed to direct and co-ordinate purchases of Government.
8—Parrett Tractor Co. reorganized with a capital of $3,000,000. Claire Barnes and Vincent Bendix interested in new company.
10—War Industries Board places aircraft at head of new priority list for fuel supply.
10—Ford two-man tank able to carry 1200 lb. of armor makes its first appearance.
10—J. D. Maxwell joins Automotive Products Section to work with H. L. Horning.
17—Truck, motorcycle and car buying co-ordinated, by order of Chief of General Staff, which places Quartermaster officials at head of board.
18—New England Highways Return Loads Assn. formed to link all of New England.
19—Colonel George Pope, treasurer of N. A. C. C., dies.
20—M. A. M. A. appoints a war service committee to serve as a point of contact between association and Government.
23—After an investigation showing they were enemy-owned the Bosch plants were taken over by the Government.
24—Practically all tire companies increase their prices 10 per cent.

May

1—War Corporation with capital of $500,000,000 formed by Government to aid in financing war industries.
2—Rubber imports cut 37½ per cent by an order of the War Trade Board.
7—Court decides that the vacuum tank principle was not infringed by the Thermo-Vacuum system. Stewart-Warner to appeal.
8—Curtiss earnings for 1917 figured at $2,000,000 after deduction of preferred dividends.
11—Export licenses restricted by War Trade Board. Exports to Allies must be approved by War Mission before license is granted.
13—Manufacturers agree with Government that war needs demand 100 per cent priority on steel and other material needed for war products. No specified curtailment decided on for this reason.
13—Manufacturers, through N. A. C. C., accept action of War Service Committee advising schedule of 9 standard tire sizes.
13—New York passes lamp law providing that state may test anti-glare devices and approve them.
13—Inventions Section created as part of the General Staff of the War Department to investigate inventions submitted to it.
14—Archer A. Landon appointed head of the Division of Production of the Aircraft Board, which is now headed by John D. Ryan.
15—Henry Ford & Son decide to standardize Fordson tractor equipment, but will not market this directly.
15—Airplane mail service New York to Washington inaugurated.
15—Manufacture and importation of all farm equipment must be licensed after June 20, 1918, as a means of conservation. Order passed by Congress and approved by President.
15—General Electric purchases control of Bijur Motor Lighting Co. for $500,000.
20—Major F. Glover promoted to colonelcy and placed in charge of Motor Transport Service.
21—Felix Frankfurter, assistant to Secretary of Labor, placed in charge of executive part of Labor Administration to prevent competition for workers and aid in labor recruiting work.
23—Class A, AA and B trucks tested by War Department.
23—H. L. Horning resigns from Automotive Products Section.
23—Aircraft Board reorganized by President Wilson. John D. Ryan made head of the Bureau of Aircraft Production. Major-General William L. Kenly made head of Bureau of Military Aeronautics.
25—Eight thousand Class B trucks ordered by Motor Transport Service.
28—Christian Girl resigns as director of production of the Motor Transport Section. Rejoins Standard Parts Co.

June

1—Ralph De Palma wins Harkness trophy race at Sheepshead Bay.
3—Five-ton standardized tractor demonstrated successfully in Washington.
5—Canada puts automobiles costing more than $1,200 in the luxury class and prohibits their importation.
7—Profits of Willys-Overland, Inc., estimated between $7,000,000 and $8,000,000.
8—Three-ton B truck officially adopted for heavy duty hauling by War Department.
8—National Advisory Committee on Aeronautics report praises Liberty engine.
11—U. S. Highways Committee formed to co-operate with states for better roads.
11—No sweeping curtailment of steel for automobiles, according to agreement between War Industries Board and American Iron and Steel Institute.
17—Ordnance Department names managers of districts who will have charge of production under General C. C. Williams.
17—Maxim Munitions arranges with Dart for distribution of Maxim-Dart vehicles in East.
17—Overland decides on program of war economy. Number of models limited to two or three.
17—Steel temporarily withheld from non-war industries.
18—S. A. E. holds summer meeting at Dayton, Ohio.
18—C. C. Hanch made chief of Automotive Products Section to succeed Harry L. Horning.
19—G. M. C. forms coalition with Janesville Machine Co. and plans to enter the tractor field extensively.
19—Net earnings of the Fisher Body Corp. for fiscal year ended April 30, 1918, amount to $4,352,078.
19—Export restrictions modified to permit automobiles to be shipped to European neutrals and South American countries.
22—War Industries Board and American Iron and Steel Institute raise price of iron 45 cents a gross ton, making price $5.50.
25—Motor Transport Service reorganized under Colonel Glover.
26—Vesper and committee of N. A. D. A. appear before Ways and Means Committee to present need for equitable car taxation.
26—Chevrolet victor in Chicago Derby, breaking De Palma's 1916 record.
27—England contracts for entire output of Australian zinc for the period of the war and 10 years after.

July

1—War Industries Board completes program of eliminating all but nine tire sizes.
2—M. A. M. A. plans to close Washington office and permit the work to be continued by War Service Committee in charge of A. W. Copeland.
8—James S. Harlan, Interstate Commerce Commissioner, outlines plan for store door delivery for New York.
8—All shipments of articles of non-Canadian origin imported from Canada require individual licenses, according to ruling of War Trade Board.
8—Coal for passenger car makers reduced to 25 per cent of 1917-1918 amount. For war work manufacturers will receive a 100 per cent supply.
9—Steel shipments to be made without priority certificates, War Industries Board rules. Reclassification of consumers made.
10—Tax recommendation of Treasury Department to Ways and Means Committee calls for 10 per cent retail sales tax on passenger cars.
10—Consolidated classification, filed before Interstate Commerce Commission, would increase freight rates on passenger cars 100 per cent and reduce truck rates.
10—Treasury Department rules that cars exported cannot be taxed 3 per cent.
13—War Industries Board orders a reduction of more than 3000 plow types.
15—United States Fuel Administration rules that car and parts curtailment need not be in proportion to fuel reduction.
16—U. S. Employment Service completes plans for labor recruiting and co-operating with manufacturers to get unskilled men.
17—War Industries Board orders inventory of all steel in factories to show quantity on hand. Automobile industry seeks a 60 per cent steel allotment agreement.
18—Charles W. Nash made Aircraft Production head under John D. Ryan.
20—Motor truck manufacturers place before Priority Committee of War Industries Board statement of essential nature of motor truck. Priorities Board outlines liberal program and assures reasonable steel supply.
22—Army truck program settled. White 1½-ton truck substituted for original Class A type. G. M. C. substituted for original AA standard army type. Class B to be continued, and TT, four-wheel-drive, adopted for heavy work. Seventy-five thousand of four models ordered.
25—Bristol type plane abandoned, because it is hard to fly.
28—De Palma breaks world records in Chicago race. Wins 20-mile race at rate of 110 m.p.h.
30—General Motors forms definite plan to take over United Motors. To exchange stock at rate of 3/10 of share of G. M. common and 1/10 preferred for each share of United Motors.
31—Francis E. Stanley, steam car pioneer, killed in automobile accident.

August

1—War Industries Board requests rubber industry to cut production 50 per cent during August and September.
6—Manufacturers vote in favor of 50 per cent curtailment of passenger car manufacture.
6—Profiteering on farm implements barred by Agriculture Department.
9—Priority Board recognizes trucks as utilities and decides curtailment in manufacture should be avoided as far as possible.
13—War Industries Board does not receive manufacturers' offer of 50 per cent curtailment of passenger car production. Says no promises can be made regarding supplying of steel, rubber, etc.
14—Ford production totals 700,000 cars for year ending July 31.
17—De Palma wins five races and breaks four records at Sheepshead Bay races.
20—Motor Transport Corps of U. S. Army formed to control all motorized vehicles excepting creeper-type tractors. Brig.-Gen. Drake at head.
20—Senate Military Affairs Committee in report condemns airplane activities and recommends establishment of Ministry of Aeronautics.
26—War Industries Board to allow manufacturers enough steel to produce 50 per cent of amount manufactured during last 6 months of 1917 during corresponding time of 1918. Makers having more than this amount of steel on hand must turn over excess supply.
26—Tentative locations for two Ford plants chosen in Mexico, at Monterey and Guadalajara.
28—John D. Ryan appointed Second Assistant Secretary of War in charge of all army air activities.
28—Fuel Administration requests owners of passenger cars to stop Sunday motoring east of Mississippi.
28—Association of Automotive Wheel Manufacturers organized in Toledo.
31—Exports of tires, tubes and oil to Norway restricted. Definite guarantee required.

September

1—Gasoline saving on first motorless Sunday figured at 100,000 bbl.
5—N. A. C. C. votes to abandon National shows during war.
8—New preference list of 74 industries compiled by War Industries Board headed by aircraft.
9—N. A. A. J. abandons Chicago show scheduled for Oct. 28.
10—Navy airplane base at Balveston planned, to cost $3,000,000.
10—Ford Motor Co. announces that manufacture of passenger cars will be abandoned immediately. Entire plant to be devoted to war work.
10—Manufacturers of motor trucks to be permitted to maintain average truck output during last half of 1918.
11—Purchase, production and procurement of motorized army vehicles taken from Motor Transport Corps and placed under Quartermaster Department.
16—New York State approves anti-glare devices. Names of 45 tested and approved types made public.
21—War Industries Board limits quantity of iron and steel for manufacture of tractors and farm implements during year beginning Oct. 1, 1918, to 75 per cent of amount used during preceding year.
21—Standard contracts designed for war work to speed up production and guarantee against fraud.
25—Willys-Overland obtains control of 51 per cent of stock of Moline Plow Co., latter to be operated as separate concern.
25—Motors Division of Quartermaster Corps organized under Colonel Fred Glover.

30—War Board reduces solid tire sizes to 14 standardized sizes. Reductions to be made within 2 years.

October

1—Car manufacturers planning to enter truck field affected by government ruling regarding starting of new industries. Paige, Oakland, Overland, Briscoe and Columbia companies affected.
3—Air Service Clubs Association organized with Major-General Kenly as president. To promote efficiency of air service.
8—Announcement made that Division of Military Aeronautics will discard $23,000,000 of aircraft parts.
9—Ahara carbureter patent upheld when Stromberg wins decision over Zenith.
11—Tractor makers form American Tractor Assn. and will protest curtailment case with War Industries Board.
15—General Motors' earnings for first 6 months of 1918 on common are 10¼ per cent in excess of 12 per cent dividend now being paid.
18—Standard specifications for motor and aviation gasoline adopted following conferences between Specifications Committee of the Allies and the American Committee on Standardization of Petroleum Products.
18—Navy uses Liberty engine exclusively in seaplanes. Now has 900 planes so equipped in service.
19—Gasless Sundays discontinued. Seven of them saved 1,000,000 gal.
21—Merger of four Canadian companies arranged—includes McLaughlin Motor Car Co., Chevrolet Motor Co. of Canada, Ltd., McLaughlin Carriage Co., Ltd., and General Motors Co.
21—Ford Motor Co. has biggest year in history. Surplus on July 31, 1918, totaled $175,242,728.
24—Packard Motor Car Co. announces surplus of $13,657,860 on Aug. 31, 1918.
24—Fiat Co. of Turin, Italy, develops worm-drive tractor.
28—Republic Motor Truck Co. earnings for year ending June 30, 1918, are $985,084.
31—Hughes aircraft report issued. Vindicates manufacturers.
31—Wright-Martin earnings during 13 months ending June 30, 1918, were $540,678.
31—War Industries Board permits electrical and ball bearing manufacturers to sell parts for passenger car repairs.
31—American Manufacturers Exports Assn. convenes to plan building up of foreign trade.

November

2—Maxwell Motor Car Co. earnings for year ending July 31, 1918, are $2,158,836. Net surplus reduced.
2—Nordyke & Marmon factory wins pennant for best percentage of Liberty engine quota production during October.
4—Working Conditions Service established in Washington to construct uniform standards for working conditions in all industries.
4—Ford Motor Co. of Canada, Ltd., gross business totals $24,608,422 during year ending July 31, 1918. Increase of $800,000 over preceding year.
11—Armistice signed by Allied commanders and Hun envoys.
12—Tractor curtailment order modified to permit manufacturers having new designs to go ahead with them. Small manufacturers helped.
12—Production restrictions imposed by War Industires Board lifted 50 per cent for remainder of year.
15—War Industries Board plans co-operation with agencies for cancellation of contracts.
19—Ford Motor Co. plans return to peacetime quantity production basis at earliest possible moment. 25,000 cars released to dealers.
22—Export and import regulations modified. Provide for importation of 7500 additional tons of rubber.
23—New York State investigation of tractors shows they increase crop yields but do not decrease cost of operations.
25—General Motors develops Samson 2-plow tractor to sell for $650 and compete with Fordson.
25—Post Office Department plans to use army trucks with discharged enlisted men as drivers for mail service.
26—Bureau of Standards tests substitute for gasoline made by Capt. E. C. Weisgerber. Finds it satisfactory.
27—John D. Ryan, Second Assistant Secretary of State, in charge of aircraft production, resigns. No time set for relinquishment of duties.
29—Export product list revised. All manufactured rubber articles, but not crude rubber, may be shipped.
29—Non-stop flight record broken by de Haviland-4 plane with Liberty 12 engine in 550-mile trip from Dayton to Mineola.
30—United States Rubber Co. has record earnings of $21.64 a share on outstanding common during year ending June 30, 1918.

December

1—First aerial weather forecast issued by Weather Bureau in co-operation with aerial mail service.
4—Business meeting of 5000 delegates at Atlantic City under auspices of Chamber of Commerce of United States recommends that government should let business set reconstruction pace.
5—Reo annual report for year ending Aug. 31, 1918, shows increase of $1,300,000 in assets over preceding year.
7—Highways Transport Committee forms definite program for snow removal during winter. Asks co-operation of states.
7—Ford Motor Co. announces that all sedans will be equipped with electric starters hereafter.
9—Postmaster General Burleson, in annual report, says that aerial mail, city motor vehicle and parcel-post motor truck systems will be developed amazingly during the coming year.
9—Goodyear announces record profits of $15,388,190 for the year ending Oct. 31, 1918.
9—Lieut.-Col. Jesse Vincent, commended by President for services to America, returns to Packard company.
9—Annual report of Secretary of War states total appropriations for motor transportation for year ending June 30, 1918, totaled $885,000,000, of which $350,000,000 has been expended.
10—Post Office Department increases requisition for trucks. Expected that orders with truck manufacturers will not be canceled.
11—All curtailments of material and limitations of manufacture of tractors are removed.
11—Joint meeting of state highway officials and Highways Industries Assn. proposes 50,000-mile national highway and Federal Highways Commission.
13—Announcement made that all passenger cars and standardized trucks now in possession of the Motor Transport Corps in this country will be retained by army.
14—War Traed Board announces that practically unlimited export of commodities is now permitted.
18—Court decides Goodyear patents are not infringed in suit brought by Goodyear against Firestone.
19—Airplane mail service increased 600 per cent during November.
19—Substitute for platinum developed.
20—Sale of French war worn vehicles brings $6,000,000.
20—Department of Military Aeronautics plans to sell several hundred planes and engines on the open market.
20—Appropriations for air service total $164,877,253 for the army and $225,000,000 for the navy.
20—Dates set for dealers automotive exhibitions in New York and Chicago.
21—Annual report of Department Military Aeronautics made public.
21—Col. E. A. Deeds presented with engrossed testimonial on behalf of the Equipment Division of the Signal Corps.
21—October exports to Latin America show big drop, probably due to transfer of shipping.
21—Annual report of the Bureau of Mines issued to-day.
23—Four army training planes flying from the Pacific Coast reach the Atlantic Coast.
23—Major General C. T. Menoher made Director of Bureau of Aircraft Production. Col. James A. Mar to be his assistant.
23—Congressman Dent introduces bill to validate "Illegal" contracts and to provide for payments on them.
23—United States had 39 aero squadrons on the battle front when the Armistice was signed.
23—Export regulations covering South American shipments revised.
24—England partly removes restrictions on use of private cars.
24—N.A.C.C. opposes what it terms discrimatory taxation of the automobile industry.

Changes of Capital and Refinancing

Acason Motor Truck Co., Detroit. $50,000—$200,600.
Acme Motor Truck Co., Detroit. $280,000—$1,000,000.
American Machine Products Co., Detroit. $10,000—$40,000.
American Steel Tube Co., Toledo. $50,000—$100,000.
Auto Indicator Co., Grand Rapids. $15,000—$50,000.
Clum Mfg. Co., Milwaukee. $10,000—$100,000.
Columbus Varnish Co., Columbus, O. Increase to $400,000.
Comet Automobile Co., Decatur, Ill. $1,000,000—$3,000,000.
Continental Auto Parts Co., Knightstown, Ind. $10.000—$50,000.
Curtis Tire & Rubber Co., Chicago. (Old style) Vulcanized Products Co. Increase to $1,000,000.
Cygnet Mfg. Co., Buffalo. (Reorganization of Cygnet Rear Car Co.) Capital $600,000.
Defender Auto Lock Co., Detroit. $2,500—$25,000.
Delion Tire & Rubber Co., Trenton. $700,000—$1,000,000.
Denas Armor-Cased Tire Saving Co., Pittsburgh. $200,000—$1,000,000.
Dietrich Motor Car Co., Youngstown, Ohio. $15,000—$25,000.
Dort Motor Car Co. $1,500,000—$2,000,000.
Erd Motor Co., Saginaw. $100,000—$250,000.
Falls Rubber Co., Akron. $500,000—$1,000,000.
Ford & Son, Detroit. $1,000,000—$5,000,000.
Four Wheel Drive Automobile Co., Clintonville, Wis. $1,000,000—$2,000,000.
Fruehauf Trailer Co., Detroit. $100,000—$150,000.
Gary Motor Truck Co., Gary, Ind. $125,000—$175,000.
General Motors Corp. Pfd. $50,000,000—$100,000. Com. $150,000,000—$200,000,000.
Genesee Motor Car Co., Utica, N. Y. $5,000—$100,000.
B. F. Goodrich Co., Akron. Reduced from $86,400,000 to $85,500,000.
Goodyear Tire & Rubber Co., Akron, $50,000,000—$100,000,000.
Gray & Davis, Inc. Stock increased $113,000.
Gray Motor Co., Wilmington, Del. $550,000—$1,000,000.
Holt Mfg. Co., Stockton, Cal. Increase of $898,000.
Hurlburt Motor Truck Co., New York. Increase of $500,000.
Hydraulic Pressed Steel Co., Cleveland, $5,700,000—$7,200,000.
Industrial Controller Co., Milwaukee. $100,000—$150,000.
Jones Motor Car Co., Wichita. $500,000—$1,500,000.
Jordan Motor Car Co., Cleveland. $300,000—$500,000.
Kelly-Springfield Tire Co. Reduction of $248,900.
Kerosene Equipment Co., Detroit. (Kerosene Carbureter Co.) New capital $50,000.
King Motor Car Co., Detroit. $200,000—$700,000.
La Crosse Tractor Co., La Crosse. $1,500,000—$2,500,000.
Lane Motor Truck Co., Kalamazoo. $25,000—$225,000.
Lansing Forge Co., Lansing. $100,000—$300,000.
Lauson, John, Mfg. Co., New Holstein, Wis. $500,000—$1,000,000.
Mather Spring Co., Toledo. $300,000—$1,000,000.
Mohawk Rubber Co., Akron, Ohio. 1,050,000—$2,050,000.
Napoleon Motors Co., Traverse City, Mich., formerly Traverse City Motor Car Co. $150,000—$500,000.
Newark Stamping & Foundry Co., Newark, Ohio. $50,000—$75,000.
Noble Motor Truck Corp., Kendallville, Ind. $1,000,000. (Reorganization of Noble Motor Truck Co.)
Ohio Happy Farmer Tractor Co., Bucyrus, Ohio. $20,000—$40,000.
Ohio Rubber Co., Cleveland. $100,000—$500,000.
Oneida Motor Truck Co., Green Bay. $300,000—$500,000.
Peoria Tractor Co., Peoria. $60,000—$1,500,000.
Perfex Radiator Co., Racine. $15,000—$1,000,000.
Ohio Rubber Co., Cleveland. $400,000—$500,000.
Saginaw Malleable Iron Co., Saginaw, Mich. $400,000—$650,000.
Sanford Motor Truck Co., Syracuse. $50,000—$250,000.
Seaman Co., W. S., Milwaukee. $50,000—$150,000.
Sioux City Tire Mfg. Co., Sioux City. $200,000—$1,500,000.

Smith Wheel Co., Inc., Syracuse. $1,000,000—$3,000,000.
Tower Motor Truck Co., Greenville. $100,000—$200,000.
Triangle Truck Co., St. Johns. $50,000—$100,000.
Turner Mfg. Co., Port Washington, Wis. $150,000—$250,000.
Universal Motor Co., Oshkosh. $50,000—$100,000.
Victor Screw Works, Detroit. $250,000—$500,000.
Weidely Motors Co., Indianapolis. Preferred stock $100,000—$500,000.
Wisconsin Motor Mfg. Co., Milwaukee. Increase to $1,000,000.

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New Companies

Abbott-Downing Truck & Body Corp., Concord, N. H. (To absorb Abbott & Downing Co.) Concord trucks. March.
Acme Motor Parts Co., Milwaukee. Parts. $25,000. June.
Aeronautical Engine Co., Long Island City. Feb.
American Motors Co., Milwaukee. $1,000,000. Internal Oil combustion engines. Jan.
American Tire Filler Co., Seattle. $100,000. Composition fillers for tires. April.
American Tractor Corp., Richmond, Va. $1,000,000. Traction engines. Jan.
American Veneer Co., Hayward, Wis. Airplane veneers, propeller materials, gun stocks, etc. $100,000. Oct.
Andis Tool Co., Racine. Tools, dies, jigs, etc. $25,000. Sept.
Automotive Mfg. Co., Detroit. $125,000. Parts. April.
B. & H. Machine Products Co., Detroit. Airplane and truck engine parts. Oct.
Badger Chemical Co., Stanley, Wis. $500,000. Wood alcohol. Feb.
Baker Automobile Top Co., Columbus, Ohio. Tops. Feb.
Blumberg Mfg. Co., San Antonio, Tex. Farm tractors. July.
Bollstrom Motors Co., Detroit. $3,000,000. Trucks and tractors. March.
Boring Tractor Corp., Rockford, Ill. Tractors. March.
Bowling Green Die & Tool Co., Bowling Green, Ohio. $25,000. Aug.
Canadian Johns-Manville Co., Ltd., Montreal. $2,500,000. Oct.
Carolina Aircraft Co., Raleigh, N. C. $500,000. Airplanes. April.
Chicago, Waukegon & Hammond Transportation Co., Chicago. Motor truck short-hauling. Jan.
Chippewa Rubber Co. $250,000. July.
Commercial Motor Body Co., New York. Warehouse system. Feb.
Crescent Brass Foundry Co., Superior, Wis. Automotive and marine brass and bronze goods. May.
Dart Truck & Tractor Corp. (Dart Motor Truck Co.) Trucks and tractor. June.
Dependable Truck & Tractor Corp., Galesburg, Ill. Trucks and tractors. July.
Everwear Rubber Co. $200,000. Puncture-proof tires. July.
Foreign Products Corp., Ann Arbor, Mich. $350,000. Steel forgings for parts. Jan.
Great Lakes Rubber Co., Milwaukee. $100,000. Tires. April.
H. L. & W. Sales & Mfg. Co., Detroit. Tools, jigs and fixtures. April.
Hammered Piston Ring Co., Newark, N. J. May.
Hardman Rubber Corp. (To take over Hardman Tire & Rubber Corp.) June.
Hebb Motors Co., Lincoln, Neb. Patriot trucks. March.
High Efficiency Motor Corp., Brooklyn. $200,000. Automobiles and engines. Jan.
Independent Harvester Co., Ltd., Plano, Ill. $3,500,000. Farm machinery and tractors. April.
Independent Motor Co., Youngstown, Ohio. $300,000. Worm drive trucks. April.
J. M. Case Trailer Co., Grand Rapids. Sept.
Johnson Motor Wheel Co., South Bend, Ind. Gas engines. $100,000. Jan.
Kalamazoo Munitions Corp. $100,000. Ammunition. Feb.
Kaukauna Machine Works, Kaukauna, Wis. Mayer (Little Giant) power hammer. Feb.
Kuenz Radiator Co., Toledo. $100,000. Airplane, car and truck radiators. Sept.
Lambert Trubulpruf Tire Co., Everett, Wash. Trubulpruf tires. April.
Liberty Tractor Corp., Detroit. $100,000. Sept.
Marvel Tractor Co., Columbus, Ohio. Farm tractors. Feb.
Marwin Motor Truck Co., Kenosha, Wis. $1,000,000. Trucks and tractors. April.
Master Truck Transportation Co., Chicago. Chicago to New York Freight Line. Jan.
Metal Auto Parts, Des Moines. Accessories. July.
Minerva Engine Co., Cleveland. Truck and tractor engines. Jan.
Motor Appliance Co., East Moline, Ill. Marco speed recorders, Benson automatic speed signal and Ogden automobile parts. July.
Motor Transport Co., Detroit. $1,500,000. Inter-city truck lines. Feb.
Northway Motors Co., Boston. $5,000,000. Cars and trucks. Jan.
Overmeyer Airplane Mfg. Co., Cincinnati. Sept.
Parker Tire & Rubber Co., Indianapolis. Super-sized cord tires. Feb.
Power Truck & Tractor Corp., Detroit. $2,500,000. Trucks and tractors. April.
Preston Motor Car Co., Birmingham, Ala. Light cars and trucks. March.
Pronovost Wheel Co., Toledo, Ohio. $350,000. Wheels. Feb.
Puncture-Proof In-Tire Co., Dover. $1,000,000. Tire protector. Jan.
R. & P. Tractor Co., Alma, Mich. $5,000. Tractors. Feb.
Racklind & Farber, Indianapolis. Indianapolis to Chicago motor freight line. Feb.
Rapid Change Wheel Co., Grand Rapids. Supplemental Hub. $50,000.
Ross Motor Truck Co., Saginaw, Mich. $300,000. Heavy trucks. March.
Rush Motors Corp., Philadelphia. (To take over Rush Motor Truck Co.) March.
Russell Tire Co., Newark, N. J. $100,000. Jan.
Safety Signal Corp., Peoria, Ill. $200,000. Safety device. Jan.
St. Louis Aircraft Co., St. Louis. Airplanes. Jan.
Shaw Foundry Co., Milwaukee. Gray iron castings for cars and tractors. April.
Star Tractor Co., Findlay, Ohio. $100,000. One-man tractor. Jan.
Tractor Motor Co., Boyne City, Mich. Engines under Field Motor patents. April.
Tractor Parts Co., Cleveland. $500,000. June.
R. V. Trader & Co., McKeesport, Pa. Truck Carburetor. Feb.
Transport Truck Co., Mt. Pleasant, Mich. $1,000,000. Trucks. July.
Triple Airless Tire Co., Kittanning, Pa. $500,000. Feb.
United Motor Parts Corp., Chicago. Accessories. April.
United States Aero Propeller Co., Milwaukee. Propellers. June.
United States Gear Shift Co., Eau Claire, Wis. $1,500,000. Hydraulic gear shift. Jan.
Universal Motor Truck & Traction Engine Co., St. Louis. July.
Universal Products Co., Madison. Manufacture and sale of cars, trucks, machinery. $50,000. Nov.
Washington Tire & Rubber Co., Spokane, Wash. $1,500,000. Tires, tubes and tire accessories. April.
Western Machine Products Co., Cleveland. $100,000. Accessories. Jan.
Western Trailer Co., Kansas City. Trailers, trucks and bodies. April.
Wilson Motor Co., Salt Lake City. Wilco trucks. March.
Wilson Tractor Co., Peoria. $5,000. Aug.
Wisconsin Gear & Axle Co., Milwaukee. Gears and safety castor front axle. April.
Wohlrab Gear Co., Racine, Wis. Split nut steering gear. $75,000. Jan.
World Harvester Corp., New York. $1,500,000. Auto-Filler. Jan.
Zelle Tractor Co., St. Louis. $1,000,000. Jan.

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Demand for Labor in Excess of Supply

WASHINGTON, Dec. 21—The demands for labor is in excess of supply, according to reports received by the U. S. Employment Service from its Community Labor Boards in 34 States. For the week ended Dec. 6, reports from 6000 employers using more than 3,000,000 workers in 109 manufacturing districts showed the Eastern States, with the exception of the Buffalo district, suffering from labor shortage. Buffalo has a surplus of workers due to the recent discharge of airplane employes, and has within its boundaries 6000 men who are temporarily idle. Reports from 87 concerns in Detroit, employing 150,000 men, show the supply just equal to the demand. Pennsylvania districts and the New England States report heavy shortages. The Middle West reports supply just equal to demand, but heavy increases in labor requirements are expected at Chicago during the next few weeks. These are likely to cause a shortage there, which in turn may be offset by the anticipated discharge of workers in the St. Louis district, where there have been many plants engaged on war work.

The situation in the Far West is reported generally good, with the exception of California. Los Angeles reports a seasonal labor shortage and Oakland records a surplus. Shortages of labor are generally reported from the South.

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New Radio Telephone Tested

WASHINGTON, Dec. 21—An airplane formation of three planes directed by a fourth by means of the new radio telephone. was staged here yesterday in an exhibit for the benefit of Government officials. Lieut. P. D. Lucas, guiding a Curtiss plane, talking through the radio phone in an ordinary conversational tone, directed the flight of the other planes a mile away, all four flying at 2000 ft. The 3 planes went through infantry drill, side slips, tail spins and other maneuvers as directed. Communication by phone was also maintained with Bolling Field, where phones were installed and through which Lieut. Lucas' commands could be distinctly heard.

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Detailed Statements of Contractors' Claims to Be Filed

WASHINGTON, Dec. 21—The Department of Finance and Accounting of the War Department has prepared a form for filing detailed statements of claims by contractors holding cancelled orders. They are arranged to secure information of:

Number of parts or articles.
Name.
Quantity.
Kind of materials.
Weight per pc. rough.
Weight material on hand (raw, semi-finished, finished).
Original material value (raw, semi-finished, finished).
Less salvage value (raw, semi-finished, finished).
Net material claim (raw, semi-finished, finished).
Accrued labor.
Accrued overhead.
Total claim.
Is salvage value based on scrap or commercial utilization?

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To Distribute Government Property

WASHINGTON, Dec. 21—P. W. Hare, assistant director of Munitions, and Brig. Gen. T. C. Jamieson, Munitions Bldg., 19th and B Sts., Washington, have been appointed in charge of an organization to dispose of all surplus property acquired by the War Department during the war and including airplanes, airplane engines, accessories, motor trucks, motorcycles and other commodities. It is the intention of this department to so market government property as to interfere as little as possible with business conditions and they will confer when the occasion requires or upon request, with committees representing the industries affected.

S. A. Export Rules Are Revised

Shippers Must Give Evidence of Preference When It Is Applied for

WASHINGTON, Dec. 23—In order to make shipments for export to the East Coast of South America and secure preference for these, the shipper's export declaration should bear evidence of the preference to which the shipment is entitled. The declaration, if made for shipment to Argentina, Brazil, Paraguay or Uruguay, must bear the export license number, date of expiration, date of issuance of the license and number of the shipping preference.

Upon presentation of the declaration containing information as outlined in the paragraph above, collectors of customs will not only number and initial the declaration as heretofore, but will also initial the date of issuance of the license and the preference number, if any specific preference number has been given on the license.

In instances where licenses and declarations have already been filed with a collector of customs, and where the copies of the export declaration do not bear the date of issuance or expiration of the license, the shipper may, in order to secure the shipping preference to which his shipment is entitled, present such export declaration, or number thereof, to the collector of customs, who will certify the date of issuance of the license (or the date of expiry). Alternatively, the War Trade Board, either at Washington, D. C., or at any of its branch offices, will, upon presentation of the license number, give a certificate to the shipper, indicating the date of issuance of the license.

Steamship companies have been informed that where the expiration date of the license is given on the export declaration, the date of issuance of such license shall be considered as 90 days prior to the date of expiry.

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Cabling of Import License Numbers No Longer Required

WASHINGTON, Dec. 23—American consuls in foreign countries have been instructed to certify invoices without official notification from the War Trade Board upon production of a letter or cablegram from the consignee giving the import license number, commodity and quantity thereby licensed. All official notifications of license numbers cabled or mailed to consuls by the War Trade Board are still effective, and consuls will continue to certify invoices thereunder. Individual notices will be sent to all importers who have applications for licenses pending before the Bureau of Imports, where official notice to the consul is not sent by the Board due to the present ruling.

Shipping companies will be required to return at their own expense all shipments not covered by consular invoices, where invoices are required under the State Department's regulations.

The present announcement is a part of the War Trade Board's program to remove as rapidly as possible all regulations which the changed conditions brought about by the armistice have rendered unnecessary. The official cabling system has been continued up to the present time in order to protect importers who obey the regulations, by preventing others from violating them. It is now felt that the relaxation of import restrictions has reached a point where this can be done away with, and that importers who are co-operating with the War Trade Board by complying with regulations may be protected by other means.

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Sales Tax Paid by Manufacturers

WASHINGTON, Dec. 20—The total of $23,981,268.35 collected on the 3 per cent sales tax on automobiles, motorcycles, etc., in the fiscal year ended June 30, 1918, although chiefly derived from Michigan, also included payments of $3,152,132.17 from Ohio, $1,890,511.79 from New York, and $1,236,679.88 from Wisconsin, and lesser but important amounts from many other states as follows:

States and Territories	Automobiles, Motorcycles, Etc., 3 Per Cent
Alabama	
Alaska	
Arizona	
Arkansas	$24.69
California	165,590.75
Colorado	
Connecticut	190,072.60
Delaware	
District of Columbia	659.25
Florida	
Georgia	2,739.52
Hawaii	
Idaho	
Illinois	709,950.53
Indiana	978,339.23
Iowa	7,913.14
Kansas	1,889.91
Kentucky	26,995.40
Louisiana	6,697.01
Maine	
Maryland	651.24
Massachusetts	134,654.17
Michigan	14,800,679.43
Minnesota	9,815.85
Mississippi	95.00
Missouri	148,071.32
Montana	
Nebraska	748.34
Nevada	178.65
New Hampshire	934.92
New Jersey	18,442.43
New Mexico	
New York	1,890,511.79
North Carolina	7,385.15
North Dakota	
Ohio	3,152,133.17
Oklahoma	7,170.02
Oregon	120.00
Pennsylvania	308,105.80
Rhode Island	44,060.15
South Carolina	8,868.82
South Dakota	
Tennessee	429.80
Texas	116,753.05
Utah	
Vermont	
Virginia	3,571.96
Washington	534.38
West Virginia	
Wisconsin	1,236,679.88
Wyoming	
Total	$23,981,268.35

The floor tax as filed in the report of the Commissioner of Internal Revenue does not list separately the various industries upon which it was levied and which includes automobiles, cameras, playing cards, cosmetics, medicinal preparations, sporting goods, etc. The total for these preparations is $3,022,183.36.

Specifications for Government Oil

Requirements for Motor, Transmission and Slushing Oil and Greases

WASHINGTON, Dec. 23—Following are Government specifications for various oils and greases used by the different departments:

CYLINDER OIL

1. **General:**

(a) This specification covers the requirements of the Ordnance Department for motor oil to be used for the lubrication of internal combustion engines other than airplane engines and motorcycle engines. (For these engines, War Department specification number 3501, "Liberty Aero Oil," dated January 14, 1918, shall be used.)

(b) The oil shall be supplied in three grades, light, medium and heavy. The light oil shall be used where specially specified. The medium oil shall be for general use in winter and for use in new engines at all times. The heavy oil shall be for general use in summer and for use in old engines.

2. **Physical Properties and Tests:**

(a) The oil must be a refined and filtered mineral oil, or a mixture of such oils. It must be suitable in every way for the satisfactory lubrication of the internal combustion engines specified above.

(b) The viscosity of the three grades of oil, when tested in a Saybolt Universal Viscosimeter at 100 deg. Fahr., must be within the following limits:

Light oil .....170 to 230 sec.
Medium oil .....270 to 330 sec.
Heavy oil .....470 to 530 sec.

(c) The carbon residue determined by the Conradson method must be as follows:

Light oil .....not more than 0.2 per cent
Medium oil ...not more than 0.4 per cent
Heavy oil .....not more than 0.6 per cent

(d) One ounce of the oil must not congeal in a standard four-ounce sample bottle when exposed to the following temperatures:

Light oil .....25 deg. Fahr.
Medium oil .....30 deg. Fahr.
Heavy oil .....40 deg. Fahr.

(e) All tests shall be made in accordance with methods adopted by the American Society for Testing Materials, and War Department specification number 3525, "Pour Test and Conradson Carbon Test," dated February 8, 1918, a copy of which will be furnished on application.

TRANSMISSION OIL

General.

1. This specification covers the requirements of the Army for a very adhesive mineral oil, which must be suitable in every way for the lubrication of transmission gears and bearings, differential gears, worm drives, winch drives and roller and ball bearings used in connection with such parts of the equipment of motor vehicles.

Characteristics.

2. The lubricant must be a petroleum product only, without the addition of vegetable or animal oils or products, or residues or fats of any kind. It must be entirely free from fillers such as talc, resin, tar and all materials of every nature not related to the original product.

Physical Properties.

3. **Viscosity.**—The viscosity must be within the following limits, when the lubricant is tested in a Saybolt Universal Viscosimeter at 212 deg. Fahr.: 195 seconds to 220 seconds.

4. **Adhesiveness.**—The adhesiveness of the lubricant is one of the most essential qualities. As there is no satisfactory laboratory method for its determination, the adhesiveness will be determined by applying the lubricant to a set of gears operating under practical conditions, and comparing the effect produced by the lubricant with the effect produced by a standard sample of Army specifications, No. 10 under the same conditions.

NON-FLUID OIL

General.

1. This specification covers the requirements of the Army for purchases of non-fluid transmission lubricant to be used for the axles and transmissions of motor vehicles.

Physical Properties and Tests.

2. The lubricant shall be composed of cal-

cium soap and mineral oil, manufactured in accordance with the best commercial process. It must have a consistency similar to that known to the trade as "No. 00 Grease."

3. The lubricant must be a boiled grease, containing not less than 1 nor more than 1½ per cent of moisture in the finished product.

4. **Mineral Oil Base.**—The mineral oil used in reducing the soaps, when tested in a Saybolt Universal Viscosimeter at 100 deg. Fahr., must show a viscosity of not less than 180 seconds.

5. **Saponifiable Fat Base.**—Not more than 10 per cent of either pure tallow oil, neatsfoot oil, lard oil or horse oil, singly or in combination, shall be used as a fat base.

6. **Acidity.**—The lubricant must not attack a sheet of polished copper within a period of 48 hours.

7. **Heat Test.**—Two ounces of the grease shall be heated to 212 deg. Fahr., or until the entire mass becomes liquid, and then allowed to cool. The soaps must not separate from the oils during this test and the grease must return to its original consistency.

8. **Fillers.**—The grease shall contain no fillers, such as resin, resinous oils, soapstone, wax, talc, powdered mica, lampblack, sulphur, clay, asbestos or any other artificial thickening.

MEDIUM CUP GREASE

General.

1. This specification covers the requirements of the Army for a medium cup grease to be used for the lubrication of such parts of motor equipment and other machinery as are lubricated by means of compression cups.

2. The grease must be a well manufactured product, composed of calcium soap and mineral oil.

Physical Properties and Tests.

3. **Mineral Oil Base.**—The mineral oil used in reducing the soaps must show a viscosity of at least 180 seconds, when tested in Saybolt Universal Viscosimeter, at 100 deg. Fahr.

4. **Saponifiable Fat Base.**—The grease must have a fat base of 15 to 20 per cent. of either pure tallow oil, neatsfoot oil, lard oil or horse oil, used singly or in combination.

5. **Consistency.**—The grease must be a medium cup grease similar in consistency to that known to the trade as "No. 3 Cup Grease."

6. **Moisture.**—The grease must be a boiled grease, containing not less than 1 nor more than 3 per cent of moisture when finished.

7. **Acidity.**—The grease must not attack a sheet of polished copper within a period of 48 hours.

8. **Ash.**—The ash shall not be greater than 2 per cent.

9. **Heat Test.**—Two ounces of the grease shall be heated to 212 deg. Fahr., or until the entire mass becomes liquid, and then allowed to cool. The soaps must not separate from the oils during this test and the grease must return to its original consistency.

10. **Fillers.**—The greast must contain no fillers such as resin, resinous oils, soapstone, wax, talc, powdered mica, lampblack, sulphur, clay, asbestos or any other filler or artificial thickening.

SLUSHING OIL.

General.

1.—This specification covers the requirements of the Army for a very adhesive, heavy-bodied, straight mineral oil, which must be suitable in every way for the following uses:

For the **lubrication and protection** of chains, wire ropes and gears of cranes, dredges, steam shovels and all other heavy equipment.

For the **lubrication and protection** of the gears and ropes of balloon hoists.

For **swabbing** the wires and cables of airplanes and seaplanes.

For **slushing** and protecting the bright and exposed metal parts of guns, machines and automobiles during storage or overseas shipment. When used for this purpose the lubricant shall be mixed with an equal amount of kerosene so that it may be applied with a brush.

2. Kerosene may be used to remove this lubricant from the equipment.

Physical Properties and Tests.

3. The quality of the lubricant must be equal to or better than that of a standard sample of No. 1 wire rope lubricant, sample of which will be furnished by the Chief of Ordnance, Washington, D. C.

4. The lubricant must be a petroleum product only, free from vegetable or animal oils or products, or residues or fats of any kind. It must be entirely free from fillers such as talc, resin, tar and all materials of every nature not related to the original product.

5. **Viscosity.**—The viscosity must be within the following limits when the lubricant is tested in a Saybolt Universal Viscosimeter, at 212 deg. Fahr., 900 seconds to 1,100 seconds.

6. **Adhesiveness.**—The adhesiveness of the lubricant is one of its most essential qualities. As there is no satisfactory laboratory method for the determination of this quality, the adhesiveness will be determined by applying the lubricant to a set of gears operating under practical conditions, and comparing the effect produced with that produced by a standard sample of No. 1 wire rope lubricant mentioned above under the same conditions.

7.—**Corrosion Test.**—When applied to a plate of polished steel the lubricant must protect the steel for a period of thirty days from chemical vapors, from the action of salt or fresh water and from the action of water containing from 10 to 25 per cent of sulphuric acid. For the purposes of these tests the water and solutions shall be held at a temperature of 60 deg. Fahr.

Drying Test.

8. When the lubricant is applied to a wire rope that has not been oiled with any other material, it must not crack, peel or chip after exposure to low atmospheric temperatures for sixty days.

Penetration Test.

9. When applied hot to the outside of a one-inch wire rope that has not been oiled with any other material, the lubricant must penetrate to, and be absorbed by, the fiber core, and at the end of sixty days, when the rope is put under strain, the oil must be forced out of the core between the wires of the strand.

Government Maps Air Routes

Five Planes Return to Langley Field After Covering South —Others Out

WASHINGTON, Dec. 23—Five 2-seated training planes have just returned to Langley Field, Va., after having mapped out a course along the Eastern slope of the Appalachian range to Columbia, S. C., to link into the Southern trans-continental air route now being charted by squadrons of planes working both East and West from fields South of the Ohio River. The total flying time of these planes from Langley Field South to Columbia was 5 hr. and 2 min. The distance in an air line between the two points is roughly 330 miles. Columbia, S. C., is 225 miles from Souther Field, Americus, Ga., and planes flying from Souther Field North have already mapped this course. The course from Washington, D. C., to Langley Field, Hampton, has also been charted. Therefore when the planes flying from the West have reached Americus, Ga., one trans-continental air route will have been charted and ready for flight from Washington, D. C., to the Pacific Coast.

Good landing fields were found at Suffolk, Va., Franklin, Va., Pinehurst, N. C., Camden, S. C., and Columbia, S. C. The pilots reported that the terrain between Franklin and Raleigh was such that no possible sites could be located.

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Four Army Planes Reach Atlantic Coast

WASHINGTON, Dec. 23—The squadron of four Army training planes flying from San Diego has reached the Atlantic coast. This flight in formation approximates 2400 miles. The planes left the Pacific Coast Dec. 4 and they have come East across the continent in short flights limited by the size of their gasoline tanks, none of the planes carrying more than an hour and a half's supply at any one time.

The crews, two men to a plane, have gathered data and statistics on landing fields, also made air maps of the route along which they came.

This work is a part of the big reconnaissance now being made by fliers going out in all directions from over 25 fields in various parts of the country.

The material collected, as fast as it is returned to the fields, is being forwarded to Washington for analysis and compiling in the form of a Government air guide or blue book.

Major Albert D. Smith, commanding the air squadron which has come East from the Pacific, reported to-day to the Division of Military Aeronautics in Washington, D. C., that his planes left Americus, Ga., at 9 a. m., Dec. 22, and arrived at Jacksonville, Fla., at noon, having encountered rain and fog all the way and at no time having a ceiling of more than 500 ft. Major Smith expects to fly his squadron to Washington at an early date.

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Cleveland-Chicago Air Mail Postponed

WASHINGTON, Dec. 23—The Post Office Department has suspended the operation of the New York-Cleveland-Chicago air mail route until Jan. 2. Airplanes in the service will be taken apart and reassembled to insure better success when the next attempts are made. The Post Office Department states that the airplanes used in the experiments which resulted in failure last week were hastily assembled and that this caused the mishaps.

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Wisconsin Has 32,013 Vehicles

MILWAUKEE, Dec. 23—Wisconsin absorbed 32,013 passenger and commercial cars during 1918, according to the final registration figures for the year given out to-day by A. J. Cobban, head of the motor registry division of the secretary of state's office in Madison. The total number of licenses issued to private owners is 196,844, of which 189,983 were for passenger cars, and 6861 for commercial vehicles. In 1917 the combined registry was 164,531.

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New York Packard Export Office

NEW YORK, Dec. 21—The Packard Motor Car Co. has opened an export office in New York under the supervision of Fred Cardway. The company now has dealers in nineteen foreign countries, including Hawaii, the Philippines and Porto Rico.

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Schloemer Becomes Royal

OSHKOSH, WIS., Dec. 23—The Schloemer Mfg. Co., 388 Division Street, Oshkosh, Wis., operating a foundry, welding, plating and metal specialty plant, has been reorganized as the Royal Mfg. & Foundry Co., incorporated with a capital stock of $30,000. The officers of the new company are: President, Frank C. Clark; vice-president and general manager, Robert P. Hainsworth; secretary-treasurer, Peter J. Schloemer.

Contracts Placed

WASHINGTON, Dec. 23—The following contracts were placed by the Motors Division, Quartermaster Department, since the signing of the armistice, and have been approved by the Board of Review:

Nov. 27, 1918

Ford Motor Co., Detroit, 600 new style ambulances, $420,348.
Ford Motor Co., Detroit, 500 Model "T" cars, $208,830.
Ford Motor Co., Detroit, 500 Model "T" cars, $220,008.
Ford Motor Co., Detroit, 500 Model "T" cars, $208,830.
Ford Motor Co., Detroit, 500 Model "T" cars, $223,200.
Ford Motor Co., Detroit, 500 Model "T" cars, $249,055.
Ford Motor Co., Detroit, 5000 Model "T" cars, $2,542,100.
Ford Motor Co., Detroit, 50 ambulances, $34,616.94.
Ford Motor Co., Detroit, 136 ambulances, $75,953.28.

Nov. 26, 1918

Swinehart Tire & Rubber Co., Akron, 100 casings, $23,421.50.
American Chain Co., Bridgeport, 100 skid chains and 30,000 cross chains, $15,750.
Federal Rubber Co., Cudahy, Wis., 5250 ft. 2-in. I. D. 3-ply radiator hose, 4125 ft. 1¾-in., $1,792.50.
B. F. Goodrich Rubber Co., Akron, 11,995 casings, $252,784.55.
B. F. Goodrich Rubber Co., Akron, 7015 casings, $57,172.25.
United States Tire Co., New York, 14,025 casings, $114,303.75.
Goodyear Tire & Rubber Co., Akron, 7675 casings, $80,587.50.
Fisk Rubber Co., Washington, 7070 casings, $74,235.
United States Tire Co., New York, 6160 casings 30 x 3½ nonskid clincher, $64,680.
Kelly-Springfield Tire Co., Akron, 10,000 casings 30 x 3½ nonskid clincher, $105,000.
Fisk Rubber Co., Washington. 1156 36 x 6 cord casings, $63,695.50.
Kelly-Springfield Tire Co., Cleveland, 1218 36 x 6 casings, $67,111.80.
Kelly-Springfield Tire Co., Cleveland, 578 36 x 6 cord casings, $31,847.80.
B. F. Goodrich Co., Akron, tubes, $26,725.40.
Fisk Tire & Rubber Co., Washington, 5650 30 x 3½ clincher casings, $59,325.
Pennsylvania Rubber Co., Jeannette, 1500 30 x 3 CNS fabric casings, 4500 30 x 3 CNS fabric casings, 250 31 x 4 CNS fabric casings, $64,220.
Goodyear Tire & Rubber Co., Washington, 16,500 casings, $134,475.
United States Tire Co., New York, 2312 36 x 6 casings, $127,160.
Firestone Tire & Rubber Co., Washington, 8000 30 x 3½ castings, $84 000.
Kelly-Springfield Tire Co., Washington, 3000 casings, $31,500.
The United States Tire Co., New York, 2000 casings, $43,780.
United States Tire Co., New York, 14,850 tires as per list, $253,218.50.
Swinehart Tire & Rubber Co., Akron, solid pressed-on tires, $113,759.10.
Fisk Rubber Co., Chicopee Falls, solid pressed-on tires, $167,942.20.
Goodyear Tire & Rubber Co., Akron, 300 tires 36 x 3½, 650 tires 36 x 5, 1000 tires 36 x 10, 700 tires 34 x 7, $135,002.
Republic Rubber Co., Youngstown, 300 tires 36 x 5, 700 tires 36 x 6, $38,380.
Firestone Tire & Rubber Co., Akron, solid pressed-on tires, $269,890.40.
Firestone Tire & Rubber Co., Washington, red tubes, $26,676.
United States Tire Co., New York, 5000 30 x 3½ casings, $52,500.
B. F. Goodrich Rubber Co., Akron, 19,100 brown tubes, $36,397.40.
United States Tire Co., New York, 6565 casings 33 x 4 SSNS cord, $161,302.05.
B. F. Goodrich Rubber Co., Akron, gray tubes to be equipped with regular MCH Schroder valves, $26,725.
Goodyear Tire & Rubber Co., Akron, casings, $258,597.05.

Nov. 30, 1918

Texas Co., New York, 18,000 gal. oil, $990.
Standard Oil Co. of New Jersey, New York, 58,000 gal. gasoline, $12,760.
Standard Oil Co. of New Jersey, New York, 6000 gal. gasoline, $1,530.
Standard Oil Co. of New Jersey, New York City, 22,500 gal. gasoline, $5,062.50.
Texas Co., New York, 125,000 gal. oil, $1,860.
Texas Co., New York, 7000 gal. kerosene, 27,000 gal. gasoline, $7,560.
Standard Oil Co. of New Jersey, New York, 27,650 gal. oil, $6,615.

Dec. 3, 1918

Goodyear Tire & Rubber Co., Washington, 14,800 casings, 16,200 tubes, $139,898.
Motors 1083, B. F. Goodrich Rubber Co., Akron, 9795 casings, $240,663.15.
Kelly-Springfield Tire Co., Cleveland, 4400 casings, $35,860.
B. F. Goodrich Rubber Co., Akron, solid pressed-on tire, $148,512.40.
Firestone Tire & Rubber Co., Washington, 22,200 casings, 20,250 tubes, $205,027.50.
B. F. Goodrich Co., Akron, 2262 36 x 6 casings, $124,590.96.
B. F. Goodrich Co., Akron, 1445 cord casings, $79,590.60.
Fisk Rubber Co., Chicopee Falls, casings, $74,578.20.
Goodyear Tire & Rubber Co., Washington, D. C., 6565 casings, $161,302.05.

—

Navy Building Transatlantic Seaplane

WASHINGTON, D. C., Dec. 21—The United States Navy is constructing a hydroplane to be equipped with three Liberty engines and capable of carrying 45 passengers, which will be used for a test flight across the Atlantic Ocean, according to reports here. The plane is being built at Rockaway, N. Y. The machine will probably carry three or four occupants when it attempts the transatlantic flight.

—

Government to Distribute Surplus Army Stocks

WASHINGTON, Dec. 21—A Surplus Property Division with an office in the Munitions Building will have charge of the disposition of all stocks of commodities and materials which have been purchased for the Army and are in excess of the requirements. No list of the surplus material is as yet available. It will be the policy to dispose of such surplus in so far as is possible to other Government agencies. For example motor trucks and airplanes will be diverted to the Post Office to the largest possible degree. A considerable portion of the balance, it is expected, will be required for export by relief organizations in Belgium and Russia and other countries. Such balance as remains will be distributed in the town market, always in such a manner as to cause the least disturbance. Offers will be first made to manufacturers so that they may purchase and re-sell if desired. Whatever surplus remains will be offered for public sale by advertising and bidding, at auction or in whatever other manner may be later determined.

—

Permit Exports to Holland

WASHINGTON, Dec. 21—The War Trade Board will now consider applications for the exportation of all commodities to European Holland. All shipments must be consigned directly to and only to the Netherlands Overseas Trust, and licenses will be valid only for shipment on vessels flying the Dutch flag. Under new rules for exporters shipping to Holland the War Trade Board procedure includes that the exporters must obtain advise from the prospective Holland importer that an import certificate covering the proposed consignment has been issued by the Netherlands Overseas Trust. The exporter must secure the number of this certificate and specify it on his license application blanks.

Lipsner Lodges Charges

WASHINGTON, Dec. 20—B. B. Lipsner, formerly Chief of the Aerial Mail Service, filed charges against the Post Office management of the service in a letter to Senator Sherman. The letter was presented to the Senate yesterday. Lipsner charges that Otto Praeger, Second Assistant Postmaster General, told him that Postmaster General Burleson was financially interested in the Glenn-Martin Aeroplane Co. He charged that the department is spending millions of dollars in constructing special planes instead of utilizing the planes turned over by the War Department. The charge is made that incompetent men have been placed in charge of the Aerial Mail Service. J. B. Corriden, the new supervisor of the Aerial Mail Service, states Lipsner, has had absolutely no aircraft experience. Dr. L. J. Busslar "from a $1,600-a-year follow up clerk in my office," says the letter, "has been made Chief of the Section of Maintenance. He is not an engineer. J. Clarke Edgerton, son of the purchasing agent of the Post Office Department and formerly an aviation lieutenant in the Army, has been made Chief of the Section on Flying, which includes testing, experiments and control of flying. He is only 21 years old. For Aerial Mail Division interests two postal clerks have been named."

When told about the letter, Postmaster General Burleson said he did not even know who owned the Glenn-Martin company.

—

Bureaus to Assist in Getting Work for Returned Soldiers

WASHINGTON, Dec. 23—Bureaus will be established by the Department of Labor in every community of the country to be known as the Bureaus for Returning Soldiers, Sailors and War Workers, and these will ascertain what employment is open for such individuals. The Bureau will co-operate in each instance with a local U. S. Employment Service. It will afford opportunities for workers to register and will classify them and will maintain such positions open in the community. It will give every possible assistance to every applicant for work. The Bureaus will be organized either through the Community Labor Boards of the Department of Labor, the U. S. Employment Service or in those cases where these bodies are not established the local Council of Defense will create the bureaus.

—

Smithsonian Preparing Exhibit

WASHINGTON, Dec. 23—The Smithsonian Institution, United States National Museum, is arranging for a permanent exhibit of the various types of airplanes built in the United States for the War Department during the present war. In addition it is installing a series of airplanes, including the reconnaissance and bombing planes used by the French Government in 1917, and also including the first Government owned airplane built by the Wright Bros.

Canada May Re-instate Duty on $1400 Tractor

OTTAWA, Dec. 21—The request of the Canadian Manufacturers' Association, as recently expressed by a resolution passed at Toronto, that the duty on farm tractors be replaced, is causing some interest at the capital. The situation is that the duty has never been really removed, but an order-in-council passed on Feb. 7, 1918, provided for its remission by the Customs Department for a period of one year. In other words, the duty is refunded to importers of farm tractors not exceeding $1,400 in value. Should no action be taken by the Government prior to Feb. 7, next the duties on imported tractors, as well as the duties on meat, cattle and traction attachments dealt with in the same order-in-council, will again be collectable. Should parliament not meet before February, an extension of the period of remission of duties can be provided for only by a supplementary order-in-council.

—

Government Slow in Releasing Plants

DETROIT, Dec. 23—None of the assembly plants of the Ford Motor Car Co. which were taken over by the Government have as yet been released. The factory at Detroit is rapidly getting back to normal production and has practically concluded its war program. The assembly factories, while they have discontinued their work, are still held by the government.

—

Ward Will Manage King

DETROIT, Dec. 23—Artemus Ward, Jr., president of the King Motor Car Co., has decided to add the duty of general managership to his office. Benjamin Siegfried, who has had active charge of King affairs for several years, has resigned to take effect Jan. 1. After this time the reins of the King Motor Car Co. will be entirely in the hands of Mr. Ward. Mr. Ward is at the present time building up a new sales organization and intends to get into production about March 1 so as to meet the spring market.

—

Reliance Wheel to Start

YOUNGSTOWN, OHIO, Dec. 23—The Reliance Wheel Co. has been organized with a capital stock of $100,000 to produce a new type of double disk wheel for use on automobiles, trucks, airplanes and tractors. The officers are: president and general manager, Joseph M. Crenan; vice-presidents, T. E. Milliken and A. J. Engel; treasurer, A. A. Aull.

—

Harry W. Ford

DETROIT, Dec. 23—Harry W. Ford, prominent in Michigan automobile circles, and organizer of the Saxon Motor Car Corp. and its president and general manager for 4 years, died in New York City last week of pneumonia. He was recently honorably discharged from the army service, after having served in the Motor Transport Corps at Jacksonville, Fla. The late Mr. Ford came to Detroit from the National Cash Register Co., Dayton, and in 1909 he became advertising manager of the Chalmers Motor Car Co. In 1914 he withdrew from the latter company, of which he was then assistant general manager, and organized the Saxon Motor Car Corp. He was president of the Saxon corporation until about a year ago, when he resigned to enter another line of business.

—

Liberty Line Revised

DETROIT, Dec. 15—Although the chassis remains practically as before, the bodies on the Liberty cars have been altered in many minor details by the Liberty Motor Car Co., Detroit. The louvres in the hood have been doubled in number on all the models and a corrugated walnut rim has been placed on the steering wheel instead of the plain walnut rim which was used previously. To make for freer radiation, the front license tag has been placed below the radiator instead of in front of it.

The touring car and roadster are now fitted with an improved windshield in which the upper glass overlaps the lower one, thus doing away with the rubber strip which formerly closed the aperture between the glasses. On these two models the rear curtain light rims are now nickel finish.

The 4-passenger body has been entirely redesigned. It was formerly a chummy or close coupled type and this has been changed to give more room and to make a better looking car. The body is of straight-line design with a bevel edge around the top and there is room for 4 persons and space to spare. The square cornered effect at the rear of the car makes it possible to take advantage of every available inch in building the rear seat and yet keep the body within the proscribed limits. The windshield is set at a slight angle. The door handles are nickel plated.

The Sedan is unlike last year's model in that it has four doors and all windows lower into the body of the doors except the rear, which is stationary. The body has been made more roomy and is equipped with a Perfection heater.

The coupe seats 4 passengers and the driver's seat is just a little forward of the other seat, which, by the way, is 36 in. wide and will accommodate 3 persons. The fourth seat is carried under the cowl when not needed. A dome light provides illumination and a Wilton carpet covers the floor, while the whole interior is finished in gray velour with silk curtains to match, with the exception of the driver's seat and the side of the body at his left, which are finished in leather. Luggage room is provided in the rear deck.

—

Springfield Sets Show Dates

SPRINGFIELD, MASS., Dec. 21—Dealers will hold a show in the Municipal Auditorium during the week of Feb. 24. The show committee is composed of Charles R. Culver (Pierce-Arrow), John S. Harrington (Hudson)), Frederick Calderwood (Chandler), and Robert M. Sauers (Federal truck).

Labor Supply Now Equal To Demand

WASHINGTON, Dec. 24—Labor, according to the Department of Labor, now is about equal in supply to demand. Shortages are continuing in New Britain and New London, Conn., and the supply of labor equals the demand in all other sections of New England.

New York City reports a supply equal to the demand with a shortage of common labor and an excess of skilled labor reported in the State. Shortages of labor are found in Pittsburgh, Philadelphia, Harrisburg and other Pennsylvania mining districts. Ohio reports a surplus of 3000 in Toledo, 500 in Cincinnati, and 5000 in Dayton while Akron shows a shortage of 2000 workers. A small shortage is reported in Joliet, Ill., while all other sections of the State report a supply equal to the demand, as does Indiana. Kansas City notes a surplus of 4000 workers. Detroit reports the supply equal to the demand.

The Southern cities, Atlanta, Louisville, Baltimore, Lynchburg and Chattanooga report shortages. New Orleans has a supply equal to the demand and Nashville shows a surplus.

Salt Lake City reports a surplus. Denver and Montana indicate a supply equal to the demand while shortage is reported from Little Rock, Arkansas. The statements from the Pacific Coast indicates a surplus of 7000 workers in San Francisco, 2500 in Oakland, and a like situation in Portland, Oregon, while Los Angeles has a supply equal to the demand.

Reports received from several industries indicate that more workers will be taken on than released during the coming week. The iron and steel industry report from 1072 employers and employing 802,600 workers last week will be using about 799,794 by Dec. 28. The textile industry report from 731 employing 236,207 workers will take on 28,000 additional workers this week.

—

To Help Soldiers Get Jobs

WASHINGTON, Dec. 15—The United States Employment Service, Department of Labor, has instructed its State directors to set in motion machinery for immediate establishment of employment bureaus for the use of soldiers, returned and demobilized. These organizations will ask the assistance of all industrial bodies in their community.

—

Wood Reports on Stocks of Fuel and Lubricants

WASHINGTON, Dec. 10—Stocks of oil on hand needed for use by the Army according to Brig. Gen. R. E. Wood, Acting Quartermaster General, in depots and camps of the United States or on board ship in transit to France, as of Nov. 1, include 978,579 gals. of aviation gasoline, 2,525,205 gals. of motor gasoline, 240,472 gals. of fighting naphtha, 256,155 gals. of kerosene and 1,075,007 gals. of lubricating oil. There are also 594,559 gals. of fuel oil and 254,117 lb. of grease in the United States.

Truck Reliability is in the Bearings

A satisfactory truck cannot be better than its bearings.

In Gurney Bearings the utmost of capacity is embodied in the one simple bearing. The maximum in the number and size of balls is used, due to the patented method of assembling. The maximum of capacity per ball is realized by virtue of close and highly perfect race contour. Both radial and thrust loads are carried on a single row of balls. Thus simpler, more compact bearings are possible.

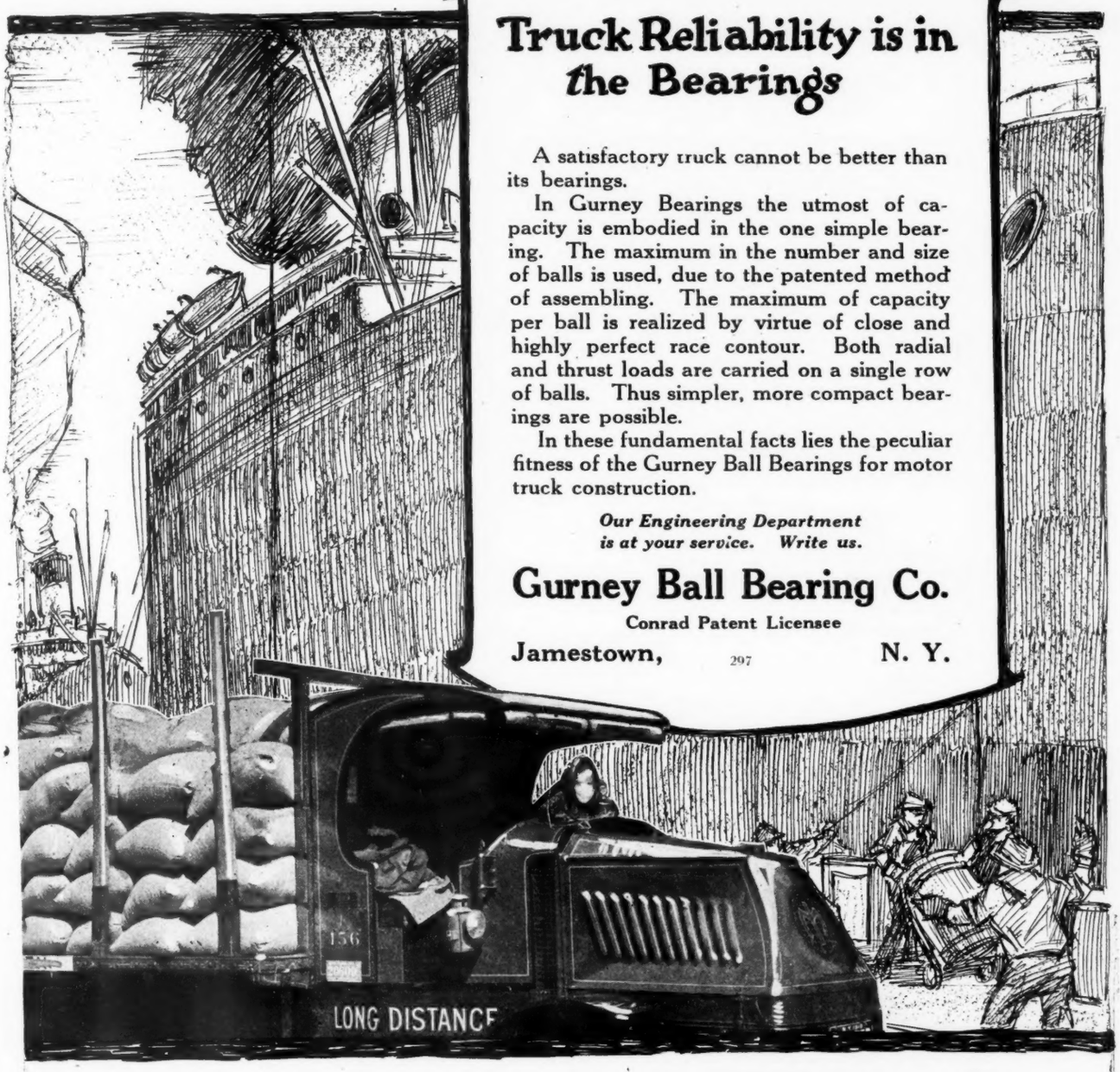
In these fundamental facts lies the peculiar fitness of the Gurney Ball Bearings for motor truck construction.

Our Engineering Department is at your service. Write us.

Gurney Ball Bearing Co.

Conrad Patent Licensee

Jamestown, 297 N. Y.



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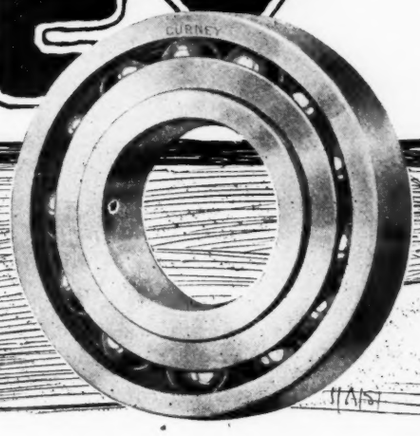

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HARVEY, NOV 12 1918.

TRUCK & TRACTOR MANUFACTURERS

U. S. A. AND ELSEWHERE

AMERICAN INDUSTRIES WERE JUST GETTING WELL STARTED IN "WIN-THE-WAR" WORK WHEN WE HEARD THE GLORIOUS NEWS OF THE ARMISTICE AND APPROACHING PEACE. DURING THE WAR BOTH TRUCKS AND TRACTORS STRIKINGLY PROVED THEIR HIGH ECONOMIC WORTH. AFTER THE WAR FOOD AND TRANSPORTATION WILL STILL BE VITAL PROBLEMS AND A GREAT MARKET FOR ALL WORTHY TYPES OF TRUCKS AND TRACTORS SEEMS AMPLY ASSURED. WE ARE FORTUNATE IN HAVING CONTINUED TO INCREASE FACILITIES FOR THE PRODUCTION OF OUR STANDARD ENGINES WHICH HAVE BEEN USED FOR VARIOUS WAR PURPOSES. WE SHALL THEREFORE BE ABLE WITHOUT WAITING FOR READJUSTMENTS TO CARE FOR INCREASED DEMAND FOR "BUDA ENGINES-HIGH CLASS" FROM OUR OLD AS WELL AS NEW CUSTOMERS.

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THE WYMAN-GORDON GUARANTEE is ready—to save you anxiety and protect the reputation of your car.

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WYMAN-GORDON CO.
Worcester, Mass. *Cleveland, O.*

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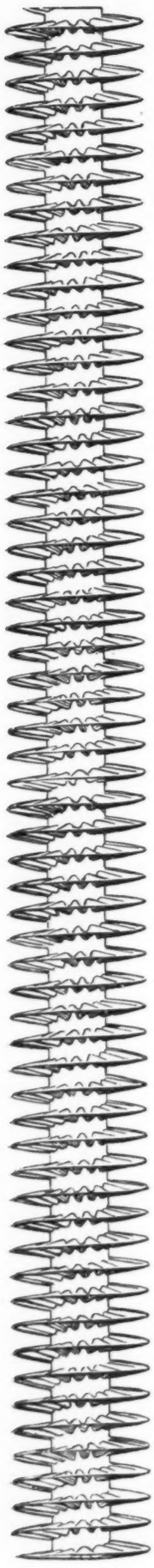

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TRUCKS and TRACTORS

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Logically the radiator for every domestic truck and tractor requirement, by reason of their remarkable efficiency record in the most exacting war service.

Prompt deliveries of quantity orders. Highest quality guaranteed. Let us know your 1919 needs.

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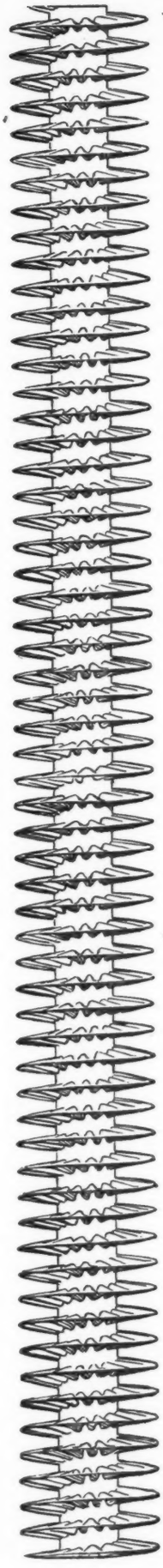


PERHAPS it is hardly the function of the publisher to offer his Christmas greetings to you, but the particular conditions and the season have gripped us—more than usual.

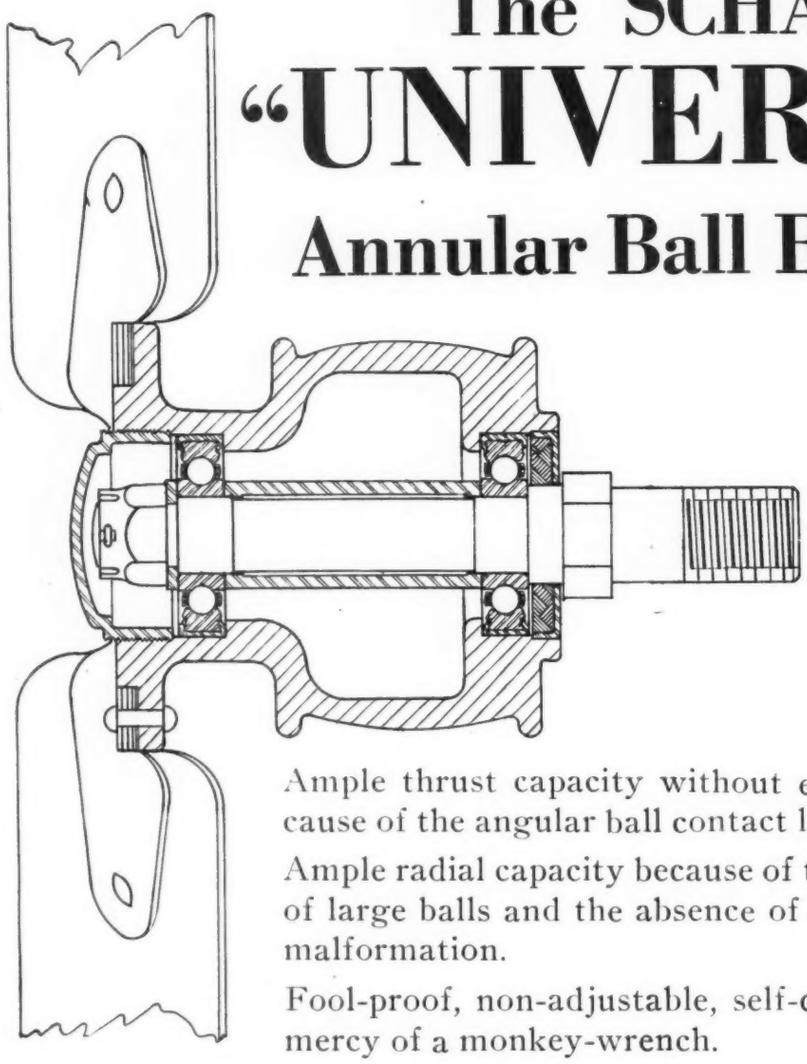
There is so much really inspiring work in front of us—as industrial leaders, designers, constructors—as men and as citizens that we cannot avoid congratulating you on the certainty of a happy Christmas over the peace so recently acquired and an inspiring New Year in the making of peace a permanent industrial service.

Merry with a deeper merriment be your Christmas, happy with a greater inspiration your New Year.

Mr. Engineer! Mr. Purchasing Agent! Mr. Auto Builder!

When you want fans without bearing troubles, specify

The SCHATZ "UNIVERSAL" Annular Ball Bearings



Note the simplicity of this assembly. The "Universal" has equal thrust capacity in either direction; consequently bearing assembly can be made either way.

Ample thrust capacity without excessive stresses, because of the angular ball contact lines.

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Fool-proof, non-adjustable, self-contained—not at the mercy of a monkey-wrench.

Silent, reliable, long-lived anti-friction bearings.

Uniformly high quality.

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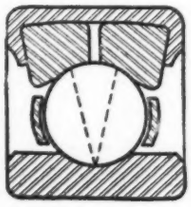

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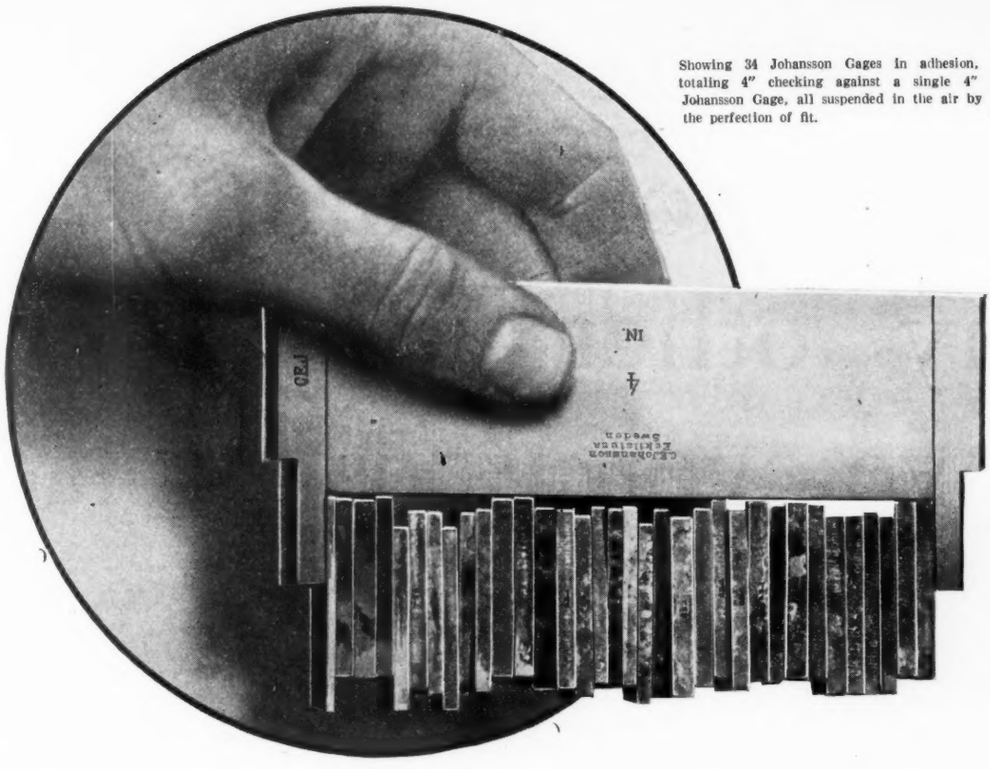

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The Limit System Motor Car

A SURVEY of the industry soon brings out the great big fact that practically all of the cars that continue year after year in the public's favor are the cars that are **manufactured**, not **built**. By "manufactured" we mean —produced in large quantities on a strictly interchangeable basis. In other words, manufactured in accordance with the Limit System.

To maintain a Limit System requires limit gages.

To maintain limit gages requires a thoroughly dependable STANDARD.

When a shop has such a standard, it can keep the various shop sizes under its control—and this is one of the most important things in modern manufacturing. When a shop has control of shop sizes, there is GO-TOGETHER-FIRST-TIME in the assembling department. And more important than this, there is GO-TOGETHER-FIRST-TIME of spare parts when the car-owner has to make replacements.

Johansson Combination Gage Blocks are in use by practically all of the big car makers and parts makers. Naturally, there are some exceptions, but they are rapidly disappearing.

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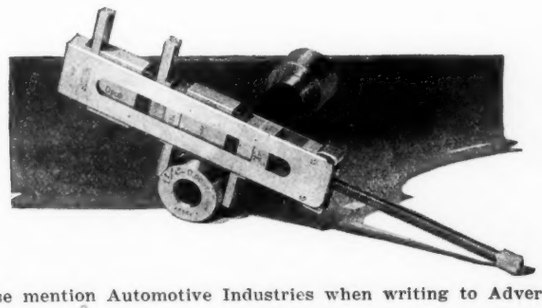

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THE original letter from which this excerpt is taken bears the signature of a marine motor manufacturer whose opinion carries the weight of knowledge and experience.

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Distinctively Best By Any Test

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Steel—Bronze—Brass—Aluminum Balls—Solid and Hollow In All Sizes for Every Purpose.

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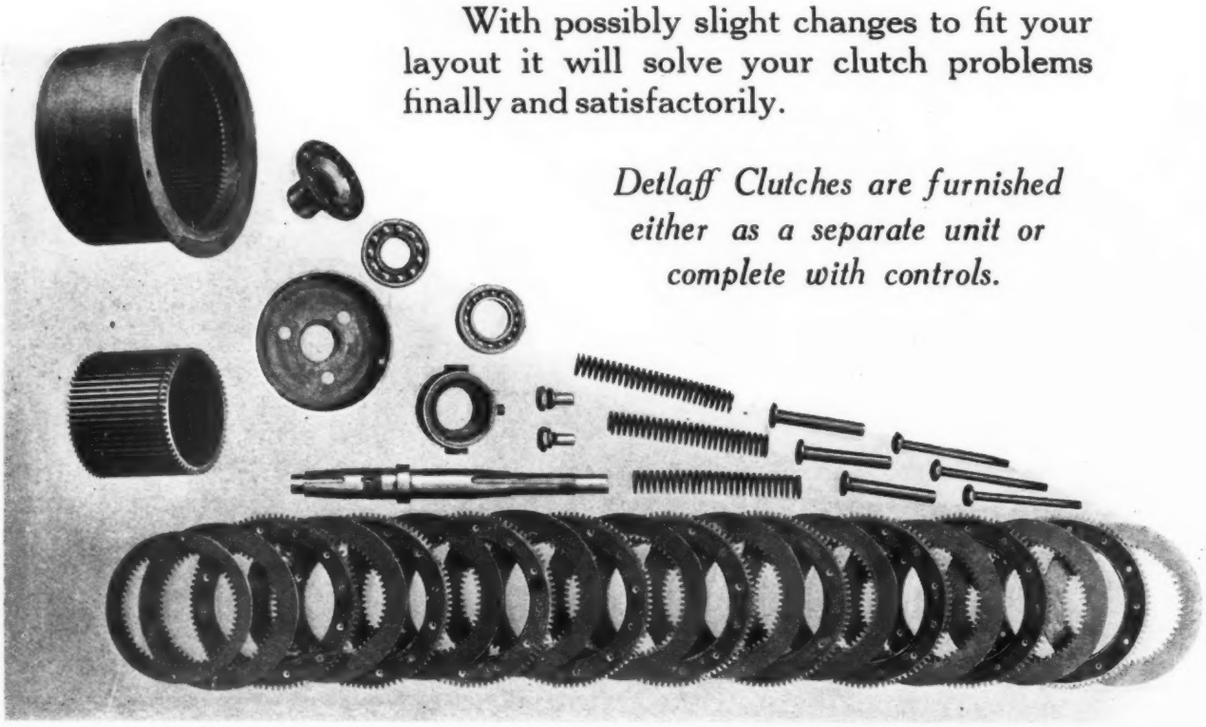
For Heavy Truck Work

THE clutch shown below, has proved to be probably the most satisfactory clutch in use today on heavy motor trucks.

It is the result of the combined efforts of some of the best engineers in the industry, and represents, we believe, the final word in clutch construction.

With possibly slight changes to fit your layout it will solve your clutch problems finally and satisfactorily.

Detlaff Clutches are furnished either as a separate unit or complete with controls.



Please mention Automotive Industries when writing to Advertisers

DETLAFF

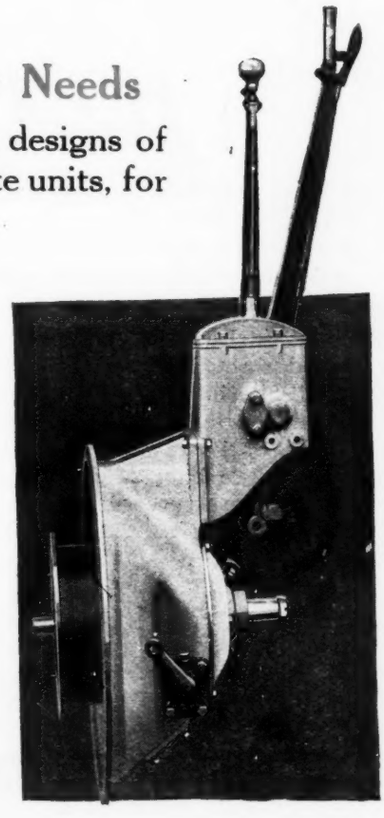
For Passenger Cars and Light Trucks There's a Detlaff Clutch, Too

The lighter models of Detlaff Clutches have proved as satisfactory for use with smaller motors, either in trucks or passenger cars.

Each is distinguished for its easy action and freedom from slipping and consequent wear—*A Velvet Clutch With the Bull-Dog Grip.*

Special Designs for Your Needs

We will gladly work with you on special designs of clutches and controls, either together or separate units, for quantity production.



Our extensive facilities, including both foundries and machine and assembly plants, devoted exclusively to clutches and controls, insure low production costs and prompt, dependable deliveries.

Let us figure with you on these parts.

A. J. Detlaff Company

123 Lafayette Blvd., East

Detroit Michigan

PHILBRIN

Reliable IGNITION

Until They Saw With Their Own Eyes They Refused to Believe!

BUT when the test was over the French Commission specified PHILBRIN, after witnessing a performance marked by a pronounced increase in power and flexibility and a startling economy of gasoline.

The Baldwin Locomotive Works had long before learned, through rigorous comparative tests, that only Philbrin Ignition would enable their big gasoline engines to deliver 100% satisfaction. Uncle Sam had been using their engines behind the battle lines of France and Belgium with extraordinary success.

Yet when France came to America for gasoline locomotives the French Commission questioned the practicability of battery ignition.

And until they saw with their own eyes they would not believe that any one system of ignition would possibly reveal such a capacity for increasing engine power, flexibility and gasoline economy. *But it did.*

The problem was to produce complete combustion, greatly reduce gasoline consumption, insure easy starting and simultaneously to fire two spark plugs in each of 6 huge cylinders in their firing order. This is a characteristic example of the many ignition difficulties which Philbrin Systems are repeatedly being called upon to solve.

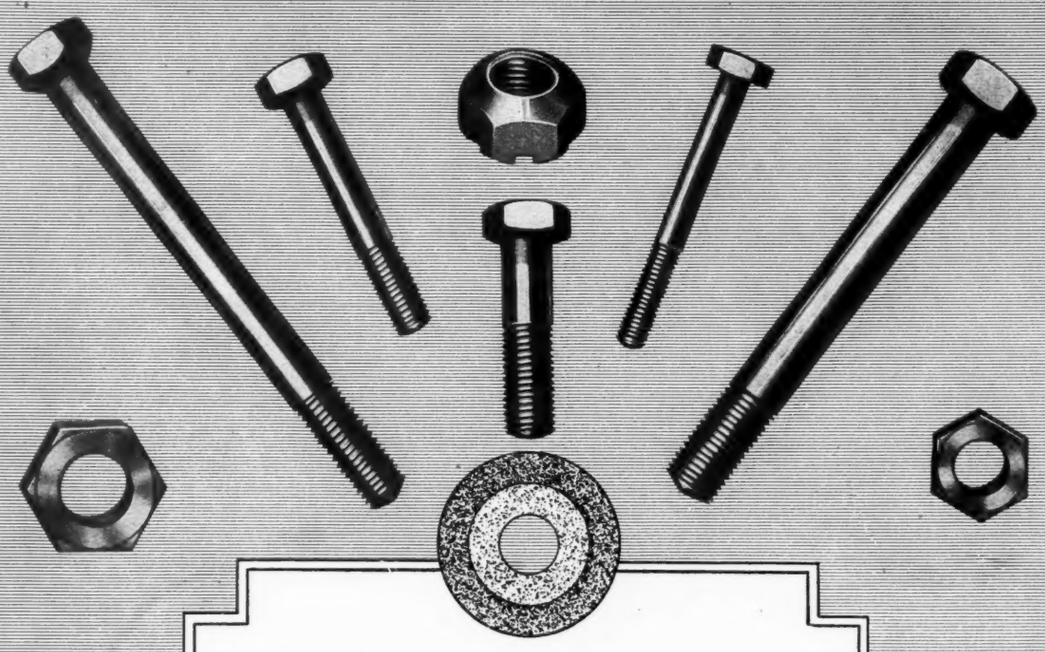
Philbrin Ignition is being used on and is obtainable for Airplanes, Tractors, Trucks, Passenger Cars and Marine Engines of any number of cylinders, of either low or high compression.

Literature upon request

PHILBRIN

PHILIPS-BRINTON CO.,
IGNITION SPECIALISTS

501 SOUTH BROAD STREET
KENNETT SQUARE, PA.



SCREW MACHINE PARTS
DO YOU REQUIRE CLOSE TOLERANCES AND CAREFUL MACHINE PRACTICE?

OUR plant is accustomed to making screw machine parts under the very rigid requirements called for in the Aircraft Industry, parts whose interior structure must be identifiable—quality the determining factor.

WILL you take advantage of the facilities of a fully equipped screw machine plant, new, modern automatic machines—complete machine shop, laboratories, cyanide case hardening equipment and two electric heat treating furnaces?

Let us quote you on your screw machine parts. Favor us with your blue prints, specifications, etc.

ERIE SPECIALTY CO.
8 West 40th St., New York City
Main Plant Erie, Pa.

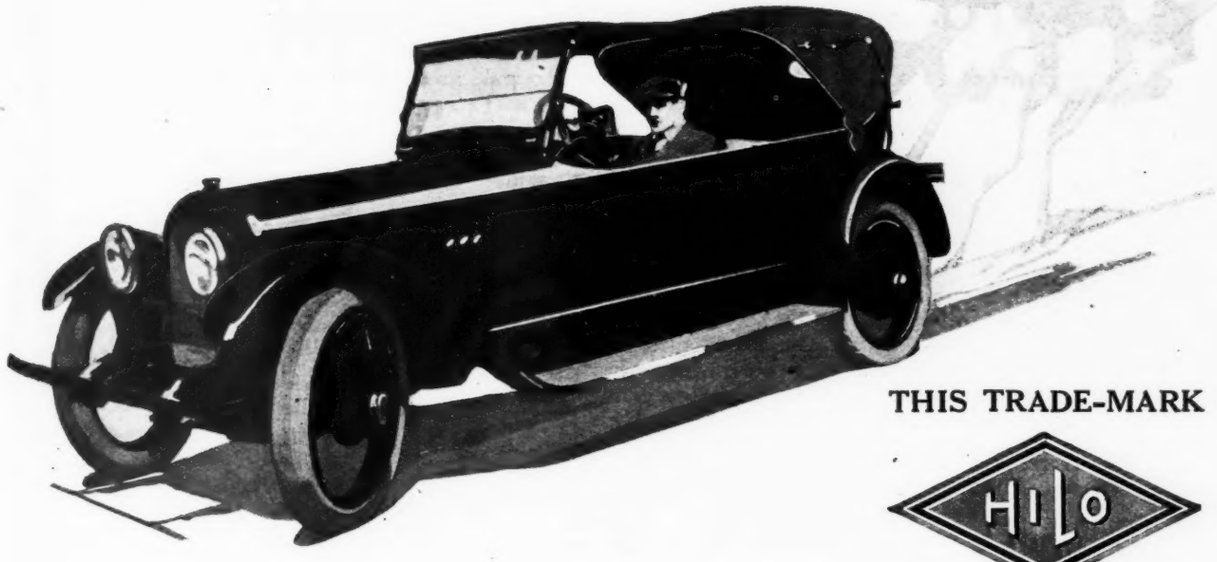
Ready for the duty asked—

It's hard, when you see a squadron of planes at rest, to picture them as a mechanical device that has overcome the Law of Gravity. For they are heavier than air. And if you hold a Hess-Bright Ball Bearing in your hands it is equally as hard to picture it as an ingenious device that has all but mastered friction. For it is simply a rugged collar of steel encircling a set of true spheres of steel. And it is so small compared to other important parts in plane and engine construction. But there are none that are more important. Speed, climbing power, control, engine action—all are dependent on bearing performance. Twenty-six places exist where Hess-Bright Ball Bearings will help to build air supremacy. That's why makers of planes buy the best. For while the Hess-Bright first cost is more, in the long run it is the least expensive. And it has been by the performance it gives that its reputation has been established.

THE HESS-BRIGHT MANUFACTURING COMPANY
Philadelphia, Pennsylvania

Where Performance takes Preference over Price

DISTINCTIVE APPEARANCE
An Added Asset



Now that the automobile industry is entering a production period that promises the keenest competition in its history, manufacturers are more concerned than ever before regarding Protective Finishes. They demand not only Wear, but the added asset of Distinctive Appearance.

Properly selected finishing materials and correct methods of applying them are a guarantee that the finish on your product will retain its attractive appearance under hard usage.

For example, take the Baked Finish as shown on the Black Japanned Hoods and Fenders of most automobiles—these parts retain their lustre and smoothness long after the finish on the average body is dimmed and cracked.

Look Into Our Baking Finishes.

THIS TRADE-MARK

HILO

ENAMELS—JAPANS—VARNISHES

typifies all that is best in Finishing Materials.

For Automobile Fenders,
Hoods, Radiator Shells.

936 Black Baking Undercoat and
934 Black Baking Finishing Japan

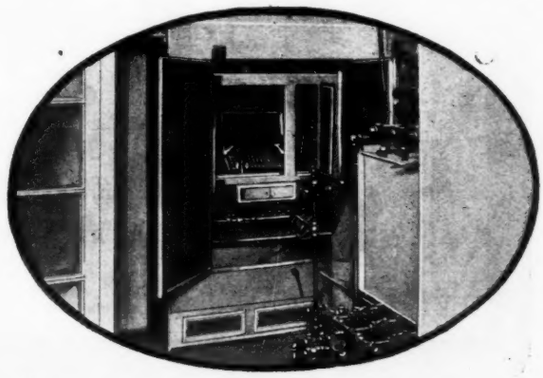
are adapted to use for dipping or spraying and for baking in Stationary or Conveyor type ovens.

The baking time for each coat may be fitted to your production schedule:

300° F. for 3 hours, or
475° F. for 35 minutes

or at intermediate temperatures in proportionate time.

Our experimental japanning ovens where goods can be baked at temperatures up to 500° F.



HILO VARNISH CORPORATION

5 GERRY ST., BROOKLYN, N. Y.
CHICAGO, ILL.

Pacific Coast Representatives:
The Brininstool Company Los Angeles, Cal.

"The Right Timken or None"

A Fundamental Policy of Timken Engineering

To the owner of a tractor, truck or motor car, one Timken Bearing looks very much like another, except in size, for all have the same basic principles of design.

Furthermore all Timken Bearings are of absolutely the same quality, made of the same Timken-made steel, machined, carbonized, heat treated, ground, inspected, tested, and assembled in exactly the same way.

Yet there is a sufficient difference between the bearings on the front axle spindle of your car and the ones at the corresponding point in any other model—even of the same make—*to receive careful study by the best engineering brains Timken can devote to it.*

Past experience, of course, makes each new installation easier, and the difference between two vehicles is sometimes very slight.

But the all-important fact remains that Timken *takes nothing for granted.*

It may be only a little variation in the taper or length of a roller, in the thickness of a cone or a cup, but Timken engineering insists that there can be only one correct Timken Bearing—out of all possible variations—for any particular place in any particular make and model of tractor, truck or motor car.

Therefore every detail in the specifications which can affect the operation of the bearings is given thorough consideration by Timken engineers and discussed in conference with the engineers of the car-builder, axle-builder, or transmission-builder, as the case may be.

These progressive manufacturers not only welcome, but urgently request this co-operation, because they realize how valuable to their customers is the highly specialized experience of Timken engineers, in working out thousands of bearing installations in every past and present type and size of automotive vehicle.

However, if some one manufacturer should prove the rare exception and insist on bearings not suited to his car, because of price or any other consideration, Timken will, as has been the case on past occasions, pass up this business, whatever it might mean in profit.

Timken engineering goes beyond the point of insisting on the proper bearings. It also insists on correct mounting of those bearings.

For the design and construction of the supporting parts, the accuracy with which a cup is pressed into a hub or a cone fitted upon a shaft may affect the future satisfaction of the owner.

The remarkable record of Timken Bearings in service is due to three equally important factors:

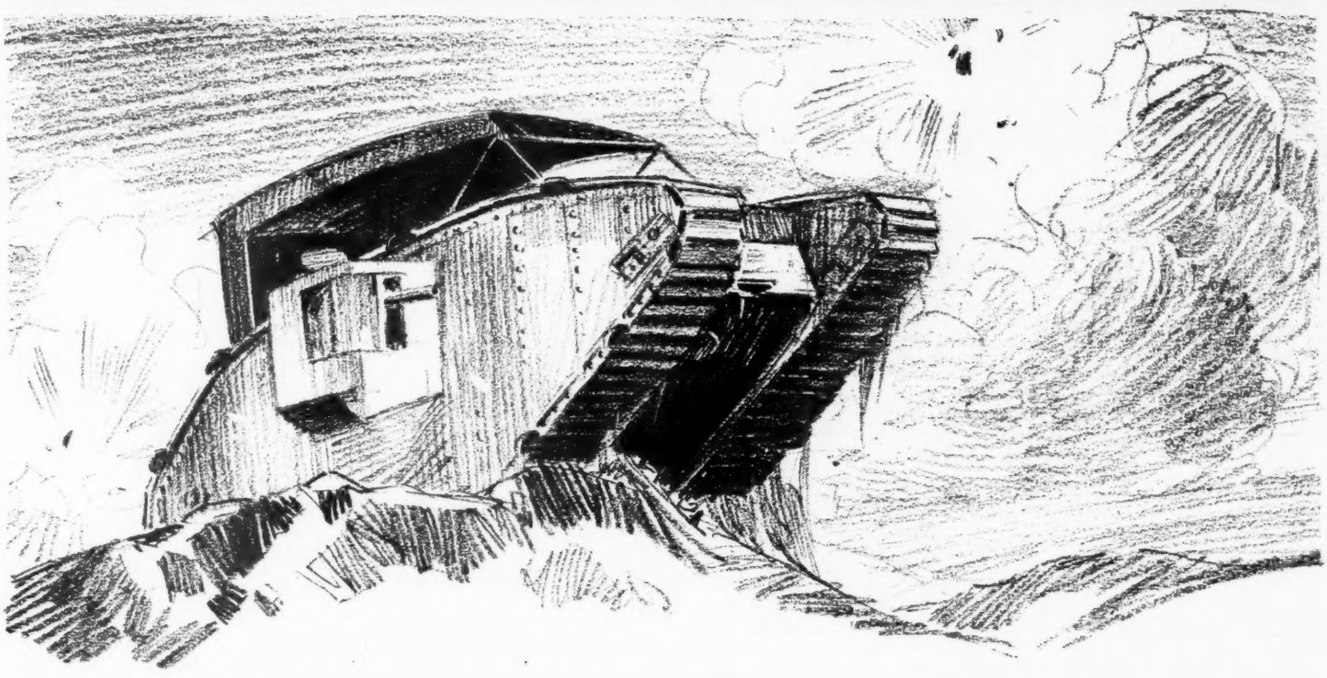
1. Fundamentally correct principles of design, applicable to any installation in any type of motor vehicle.

2. Adequate manufacturing experience and equipment, even to the making of the steel itself.

3. Insistence upon proper selection and correct mounting of the one proper bearing for every installation.

THE TIMKEN ROLLER BEARING COMPANY
Canton, Ohio.

TIMKEN
BEARINGS
FOR MOTOR CAR, TRUCK & TRACTOR



If TANKS had TOPS

DUXRANE Top Material wouldn't stop the bullets and shell fragments, but it would "carry on" through everything else—rain, snow, sun, and mud, hail and hard usage.

You can "treat it rough" with impunity.

DUXRANE
REG. U.S. PAT. OFF.
SINGLE TEXTURE TOP FABRIC

is not only smart looking and rich in appearance, but it holds its good looks. It has been put through the severe "scrub test" before leaving the factory. It will fold without creasing, stand exposure without fading or losing its smooth, even surface.

It is a thoroughly made, high quality top material.

Write for Samples

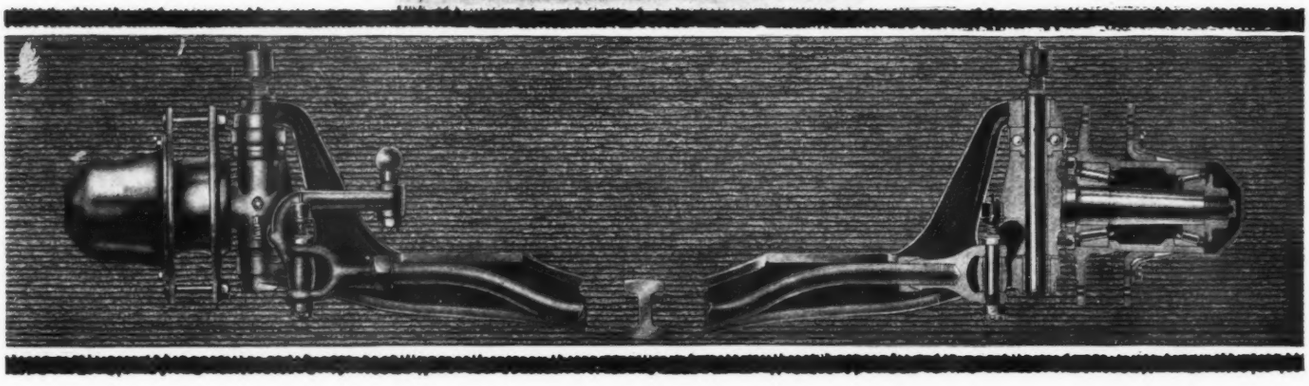
O'BANNON COATED FABRICS
TRADE MARK
REG. U. S. PAT. OFF.

O'BANNON CORPORATION
200 Fifth Avenue, New York

Manufacturers of a complete line of coated fabrics of every description. Ask for samples of Rubberized Top Fabrics, Single and Double Textures, and of Leather Substitutes for entire trimming.

O'BANNON COATED FABRICS
TRADE MARK
REG. U. S. PAT. OFF.

SHELDON



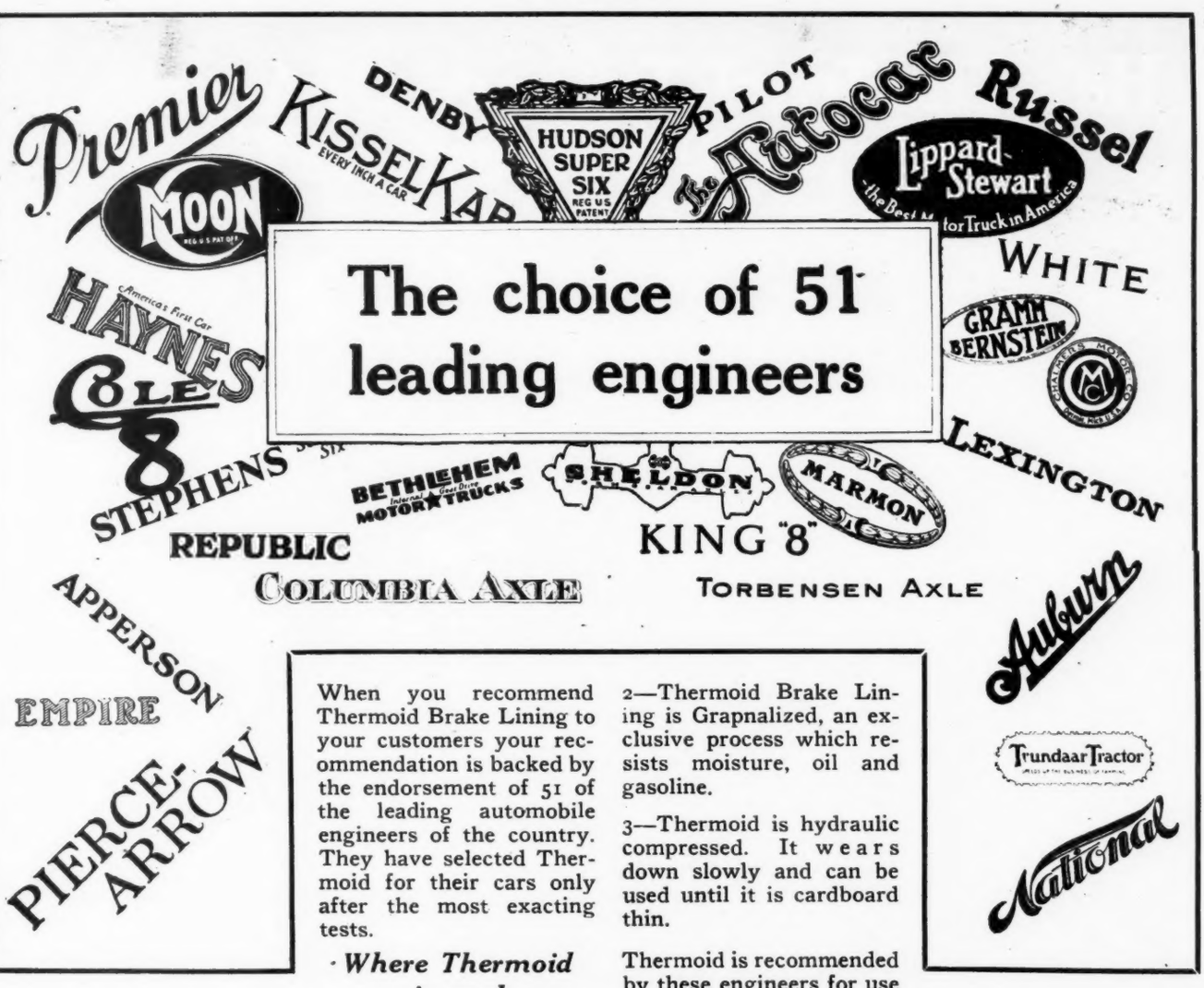
PRECISION MEANS SAFETY

Where "short cuts" mean risk, Sheldon takes the longest way around, rather than accept the the doubtful benefits of quicker methods.

It might, for example, be easier—and cheaper—to build a welded steering knuckle. But your truck, its load and its driver are staked against the strength and efficiency of this little part. So Sheldon *drop forges* every steering knuckle in *one piece*, from chrome nickel steel. Then, to guard against friction and give lasting assurance of absolute safety, it is ground to size within micrometer limits.

This way of doing even the little things naturally makes Sheldon Axles somewhat higher in price than the average. But you don't mind paying a little more to start with, when you get such everlastingly economical service as every Sheldon-equipped truck is sure to give.

SHELDON AXLE & SPRING CO., *Makers of axles and springs for heavy duty service for more than 50 years* Wilkes-Barre, Pa.



The choice of 51 leading engineers

When you recommend Thermoid Brake Lining to your customers your recommendation is backed by the endorsement of 51 of the leading automobile engineers of the country. They have selected Thermoid for their cars only after the most exacting tests.

Where Thermoid is used

Notice the varied types of cars in which Thermoid is used. High priced heavy cars where service—not cost—is the prime consideration. Lower priced popular cars whose makers are willing to pay a little extra for brake lining that gives the maximum safety. It is also used on the leading axles. The engineers designing these axles are particularly well qualified to weigh the merits of brake lining.

Why Thermoid was selected

There are three reasons why Thermoid has been selected by this critical body of competent judges.

1—Over 40% more material and 60% more labor are used in Thermoid than in any woven brake lining. This gives longer wear.

2—Thermoid Brake Lining is Grapnalized, an exclusive process which resists moisture, oil and gasoline.

3—Thermoid is hydraulic compressed. It wears down slowly and can be used until it is cardboard thin.

Thermoid is recommended by these engineers for use on new cars because it gives dependable service and helps to build good will for their products. It should be recommended by you for relining jobs because it will help to build good will for you. Write today for information.

Thermoid Brake Inspection Chart

At speed of	A car should stop in
10 miles per hr.	9.2 ft.
15 " " "	20.8 "
20 " " "	37 "
25 " " "	58 "
30 " " "	83.3 "
35 " " "	104 "
40 " " "	148 "
50 " " "	231 "

Will your car do this?

Every foot of Thermoid is protected by ***Our Guarantee. Thermoid will make good—or WE WILL.***

Thermoid Rubber Company

Factory and Main Offices: Trenton, N. J.

Factory Branches:

New York, Chicago, San Francisco, Detroit, Los Angeles, Philadelphia, Pittsburgh, Boston, London, Paris, Turin

Canadian Distributors:

The Canadian Fairbanks-Morse Company, Limited, Montreal

Branches in all principal Canadian cities

Makers of "Thermoid Crolide Compound Casings" and "Thermoid-Hardy Universal Joints"

Half The Truck Tonnage Of America Is Carried On Firestone Tires

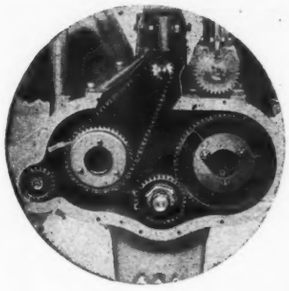
FIRESTONE built the first truck tires and has held leadership in this field ever since. The result is that half the truck tonnage of the country is now carried on

Firestone
Truck Tires

The Firestone Giant Truck Tire shown here gives traction that puts trucks through snow-drifts, mud-holes and all the worst road conditions winter brings.

There are many other types and sizes of Truck Tires in the complete Firestone line, including the Giant Pneumatic Cord. Consult a Firestone man. He has every type to offer.

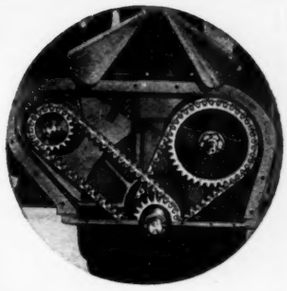
FIRESTONE TIRE & RUBBER CO.
FIRESTONE PARK AKRON, OHIO
Branches and Dealers Everywhere



PEACE BRINGS

RECONSTRUCTION
RENEWALS
REPAIRS

Scientific Management Plans Ahead, Using Expert Economy Engineering Service



PEACE NEEDS WILL BE RUSH NEEDS in all the WORLD'S markets

SPEED PRODUCTION AND LOWER COSTS WITH AMERICAN Efficiency, Quality and Delivery in

OUR AMERICAN SHIPS WILL SELL AMERICAN AUTOMOBILES

in every port of the world

"SERVING TOGETHER"
will chart the path to a very
wonderful tomorrow

A WORLD'S MARKET FOR AMERICAN AUTOS

Our Automotive Industries are admitted by all the Foreign manufacturers as the Leaders in Efficiency and High Standard, and under the present stress of reconstruction the World Looks to Us for Production and Supply

When the poise of Industry arrives, competition follows

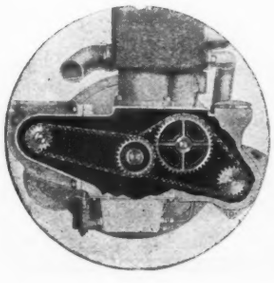
NOW IS THE TIME TO RUSH EFFICIENCY CHANGES AND EXTENSIONS

INSURE YOUR PRODUCT AGAINST COMPETITION by installing "MORSE FRONT END DRIVES," the only 99% efficient Silent Power transmission known to science

QUIET AS A BELT—POSITIVE AS GEARS

Let our expert industrial engineers work with you and design your transmission service

Morse Engineering Service Assistance Without Obligation



WRITE DETROIT OFFICE

MORSE CHAIN CO.

General Office and Works: ITHACA, NEW YORK

Largest Manufacturers of Silent Chains in the World

DETROIT OFFICE AND SHOWROOMS
1003 Woodward Avenue

Write for 1919 Diary and Mem. Book
Give Firm Name, Position, Address

Foreign Credit Information

Our Credit Department, in connection with our Buenos Aires Branch and numerous correspondents throughout the World, is in a position to supply to business interests dependable foreign credit information regarding present or prospective trade connections.

The First National Bank of Boston

Capital, Surplus, and Profits, $27,000,000
Resources - - - Over $250,000,000

Branch at Buenos Aires, Argentina

NEW YORK AUTOMOBILE SHOW

MADISON SQUARE GARDEN
and
69TH REGIMENT ARMORY

(Both Buildings Within a Stone's Throw of Each Other)

FEBRUARY 1 to 8 *Inclusive*

For Passenger Cars

FEBRUARY 10 to 15 *Inclusive*

For Commercial Vehicles

(In Madison Square Garden Only)

Accessories and Parts Will Be Shown During Both Weeks

Reserve your space now. Tomorrow may be too late. Diagrams and other information now ready for distribution. The leading makers will be at THE BIG SHOW of the year.

AUTOMOBILE DEALERS ASSOCIATION OF N. Y., Inc.

CHARLES A. STEWART, Manager

206 West 55th St., (near Broadway) New York City

SHOW COMMITTEE:

CHARLES H. LARSON, (Oldsmobile) Chairman

H. R. BLISS (Dodge Brothers) CHARLES M. BROWN (Winton) HARRY J. DE BEAR (Maxwell-Chalmers)

R. J. GILMORE (Packard) WILLIAM C. POERTNER (National—Scripps Booth)

WALTER C. WOODS (Peerless) CHARLES A. STEWART, Manager

Don't Let the Winter Storms Tie Up Your Shipping Schedules!

UNCLE SAM has granted Letters Patent on Kissel's ALL-YEAR Cab because—"it is highly desirable to have a motor truck cab that fully protects drivers during the cold, wet months, enabling them to keep their trucks in continuous service during the winter."

This winter, of all winters, calls for not only ***continuous*** but ***increased*** transportation. Maintaining schedules and meeting shipping dates ***in time*** and ***on time*** are essential.

Kissel's weather-proof **ALL-YEAR** Cab increases the personal efficiency of motor truck drivers by giving full protection in wet and stormy weather—removes the necessity of lay-ups on account of rain or snow storms—discourages speeding to get under cover—diminishes possibilities of accidents and excessive wear and tear—insures competent handling and care of trucks by attracting high class operators—keeps trucks in operation the year 'round regardless of weather.

The ALL-YEAR Cab is exclusive with Kissel Trucks. As a step to insure transportation certainty this winter—see your nearest Kissel Truck dealer.

Kissel Motor Car Co.

Hartford, Wisconsin, U. S. A.

With the removal of the winter attachments—windshield, door, side and rear windows—the **ALL-YEAR** Cab becomes a cool summer cab.

Kissel's ALL-YEAR Cab for KISSEL TRUCKS

Spring Service for A Nation.

QUALITY VULCAN

The Replacement Spring

QUALITY VULCAN AUTOMOBILE SPRINGS

IN STOCK FOR YOUR CAR

Sign and Display Rack FREE

The Display rack and Service Sign is Furnished **Free** with the first order, including appropriate advertising helps.

America's Motorists

have been educated by national advertising to look for VULCAN Service signs when in need of Spring Replacements.

Performance of VULCAN Springs on their cars has convinced them of the Superiority of VULCAN.

VULCAN Dealers

are profiting by the demand created through national advertising, combined with supreme quality of VULCAN Springs and convenience of VULCAN Service.

VULCAN Service

embraces the needs of both motorists and dealers, supporting each to the highest degree of efficiency. A constant stock of over 100,000 VULCAN Springs furnishes the source of supply. The individual supremacy of each spring, because of the "built in" quality, assures satisfaction to user and distributor.

Become a VULCAN Dealer and enjoy the benefits of a ready made market.

Write for particulars regarding VULCAN.

JENKINS VULCAN SPRING CO.
Richmond, Indiana

BRANCHES.

St. Louis, Mo.	1402 Chestnut St.
Minneapolis, Minn.	1024 Hennepin Ave.
Dallas, Texas.	209 S. Houston St.
Reading, Pa.	538 Franklin St.
Sumter, S. C.	29 Caldwell St.
Atlanta, Ga.	48 Auburn Ave.

JENKINS VULCAN SPRING CO. RICHMOND INDIANA

AN OUTLINE OF THE

STATISTICAL NUMBER

January 16th, 1919

"AUTOMOTIVE INDUSTRIES"

The changes which have been effected in the automotive field by the war, and the new outlook for reconstruction, suggest the necessity for a comprehensive survey of the conditions and tendencies.

Just now such a survey will perform a service of particular value, presenting the picture of developments in peaceful times and changes from war's necessities.

The estimate of future necessities must be based upon survey and analysis of past performances and present conditions.

It is this important summary which will be presented in "AUTOMOTIVE INDUSTRIES" January 16, 1919.

The outline given is, of necessity, a mere skeleton of what the actual publication will contain. It is offered as an indication of its scope and character and not as a measure of its extent.

It will take up

FARM TRACTORS

Production, general, by years and by units.

Usage, in different states and under different conditions.

Market, as indicated by the agricultural requirements, in detail.

The types of tractors and their development.

Export conditions.

MOTOR TRUCKS

Production, general, by years and in other details.

Use and possibilities, by states, by capacity and by industries.

Export conditions.

Specifications showing types and developments.

AUTOMOBILES

Production, by years, by states and general.

Use, by states.

Export conditions.

Types and developments.

Airplanes and motorcycles will be similarly dealt with

Fuel statistics will be given, showing the trend of production and use.

Metal statistics will indicate the trend of prices and the production tendencies.

Standardization will be thoroughly analyzed.

Many other matters will be considered and analyzed in comprehensive detail, but sufficient has been stated to show the important character of this survey and its value as a study and reference to the automotive industry.

It is hardly necessary to refer to the position of "AUTOMOTIVE INDUSTRIES" and its authority in the field.

It numbers among its subscribers the important men in all branches of the field, its pages are read thoroughly by the industrial leaders and the copies are filed in the libraries of its subscribers.

Edited for the industry, it is read by the majority of the men who control the production of automotive apparatus, etc.

It numbers among its subscribers a small but influential group of large distributors of automotive apparatus, a number of executives in allied industries and an effective audience of foreign manufacturers and importers of automotive apparatus in the various countries of the world.

Your advertisement in this issue will be read by the buyers who control the large expenditures in the automotive field.

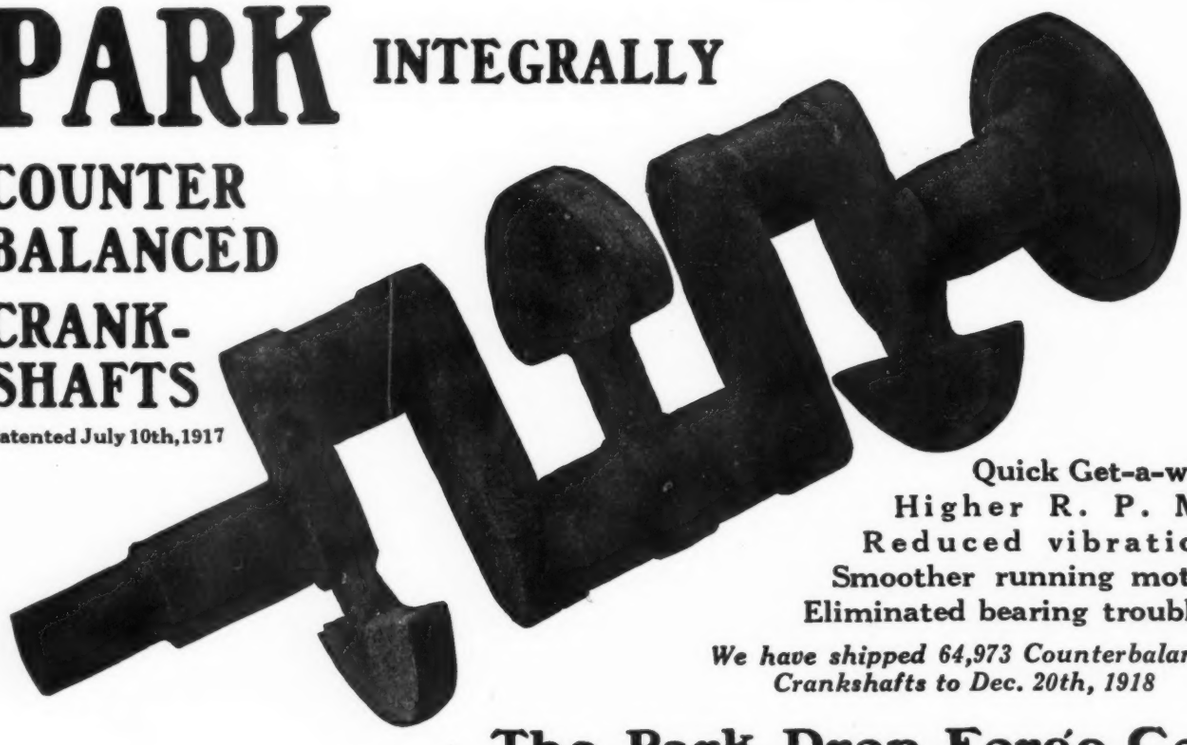
Copy should reach us promptly, and preferably of a kind suitable to the character of this issue.

AUTOMOTIVE INDUSTRIES
THE AUTOMOBILE

PARK INTEGRALLY

COUNTER BALANCED CRANK-SHAFTS

Patented July 10th, 1917



Quick Get-a-way
Higher R. P. M.
Reduced vibration
Smoother running motor
Eliminated bearing troubles

We have shipped 64,973 Counterbalance Crankshafts to Dec. 20th, 1918

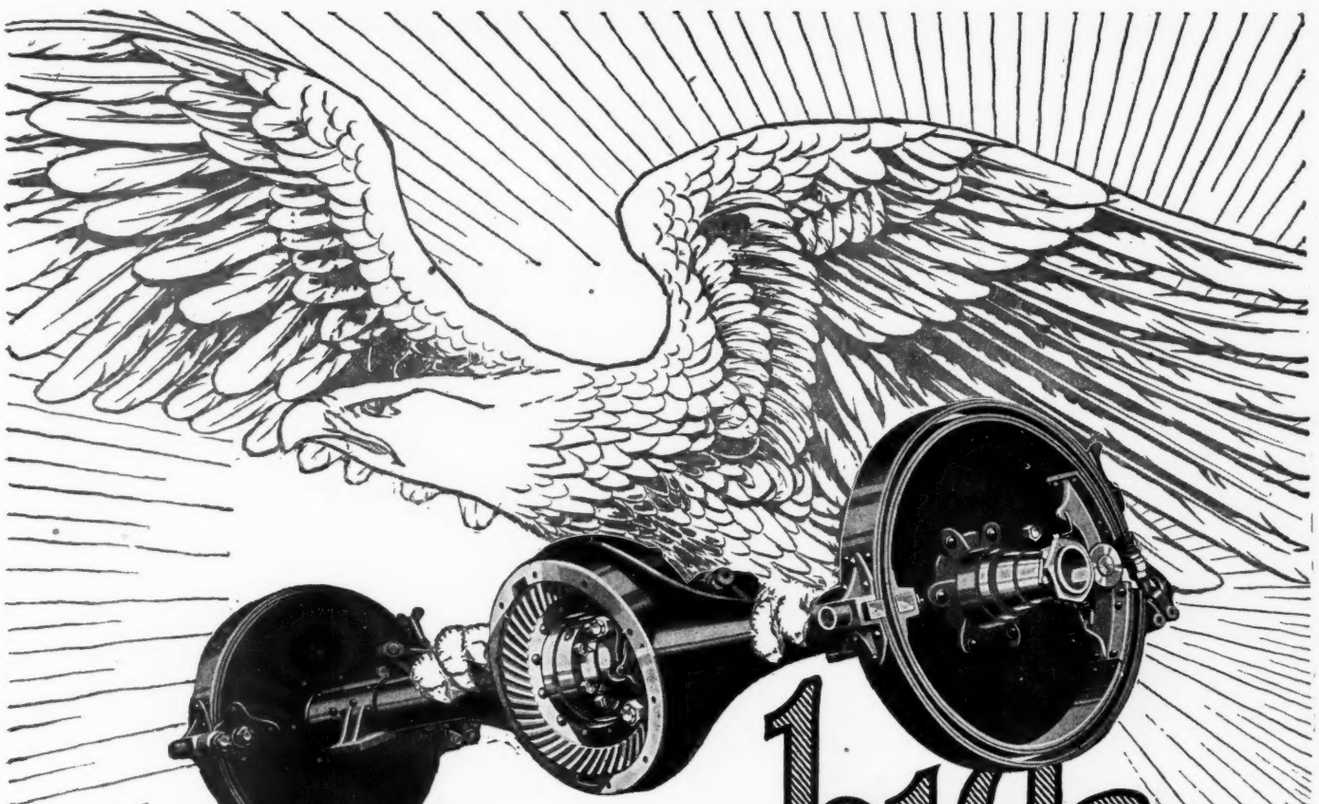
The Park Drop Forge Co.
Cleveland

Are Your Needs *Similar?*

FIFTEEN Manufacturers have indicated to our CONTRACT WORK DEPARTMENT that they could use to advantage information as to where they could place the following lines of surplus manufacturing work:

Castings (steel, brass, bronze or aluminum)
Dies
Tool
Metal Stampings
Punch Press Work
Screw Machine Work
Machine Parts
Gear Cutting
Grinding
Cam Cutting
Bar and Clutch Work
Forgings
Drop Forgings
Lathe and Milling Machine Work
Patterns (wood & metal)
Plating
Automobile Stampings
and other lines.

In this connection you can consult with profit our ***Contract Work Department*** this issue.



Columbia Axle

The Height of Successful Axles

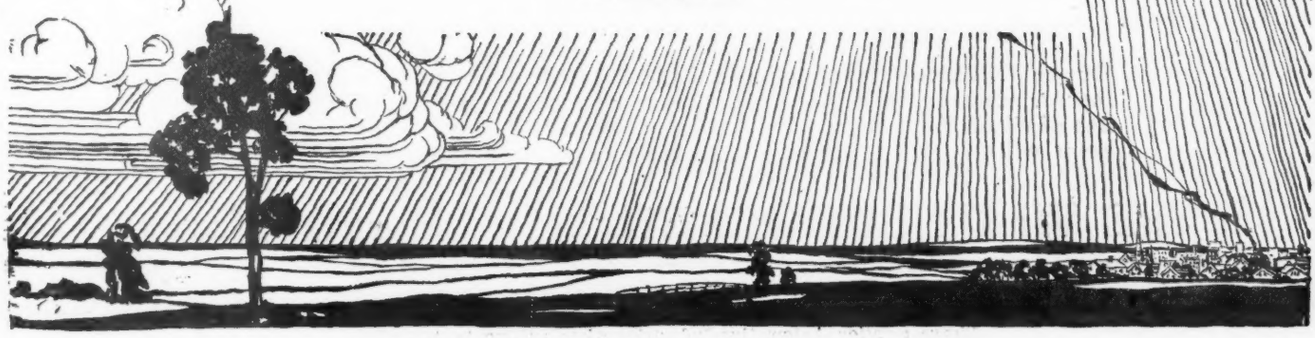
Scientific production facilities, vast resources, standardized systems and highly specialized methods are factors that contribute to our success in supplying passenger car axles of highest quality without excessive cost.

The manufacturing advantages which we enjoy largely offset the greater cost of exceptional materials and workmanship.

There are distinct benefits accruing to the user of Columbia axles that warrants your investigation.

May we be privileged to go into this matter with you?

The Columbia Axle Company
Cleveland, Ohio



U. S. Government Approval

AT the very beginning of the war the British Government selected the Four Wheel Drive Truck for the heaviest duty to be performed at the front. The U. S. Government selected the same truck (after thorough test) for use over the rough desert trails near the Mexican border. Later, when we entered the World War, the U. S. War Department adopted the F. W. D. as the standard truck for heavy Ordnance Transport.

The Evans Model "Hele"-Shaw Clutch, and the Evans Alignment Joint, are, and have always been, Standard Equipment on the F. W. D. Truck.

The 3-ton Artillery Tractors selected by the U. S. Standardization Board after exhaustive, rigid tests, and "Standardized" by that Board for U. S. Army use, specify exclusively the "Evans" Model "Hele"-Shaw Clutch.

Evans Model "Hele"-Shaw Clutch *(Patented)*

The "Armored" Gasoline Locomotives furnished to the Government in large quantities by the Baldwin Locomotive Works and the George D. Whitcomb Co., are equipped exclusively with "Evans" Model "Hele"-Shaw Clutches.

The "Evans" Model "Hele"-Shaw Clutches, and Evans Alignment Joints, are also exclusively used in the Motor Spraying Apparatus used by the U. S. Department of Agriculture.

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"Evans" **Universal Joints** continue to be largely used for general motor power work. The **"M & E" Ratchet Top Grease Cups** are produced and furnished in enormous quantities to a host of truck makers.

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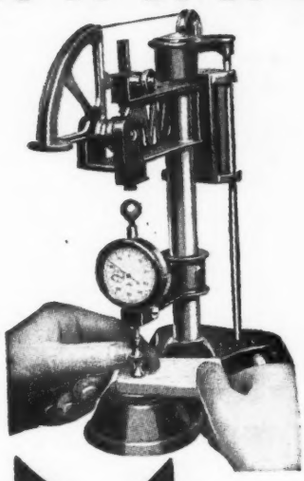

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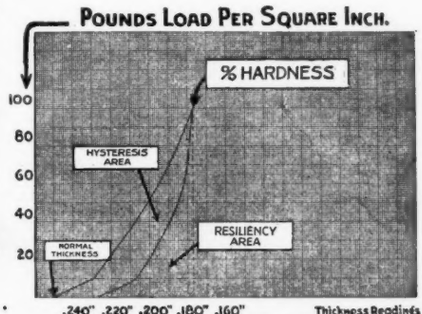

This Graph Shows Information Obtained on Specimen Tested.
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What it does.

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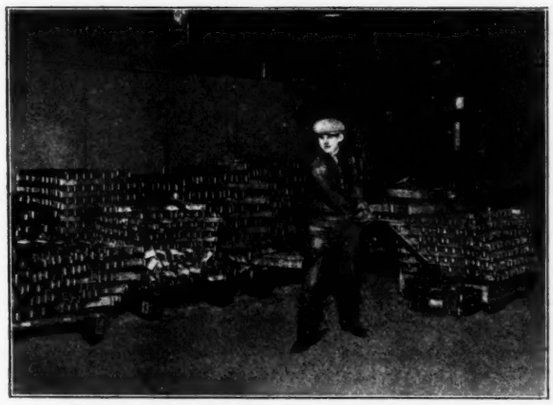

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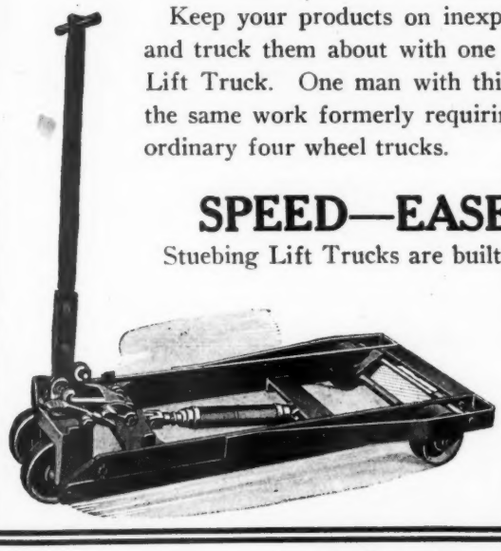

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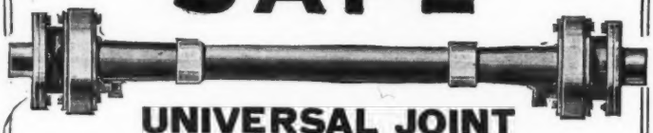

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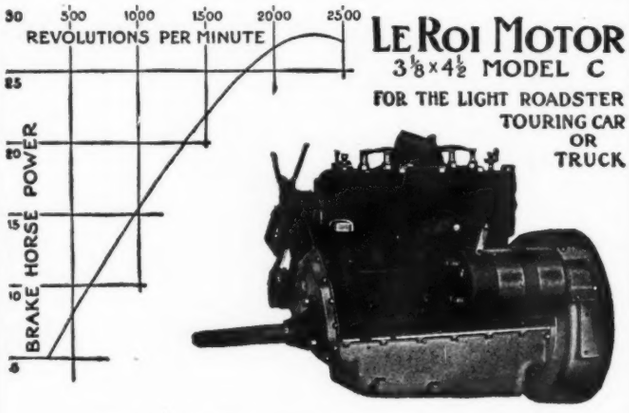

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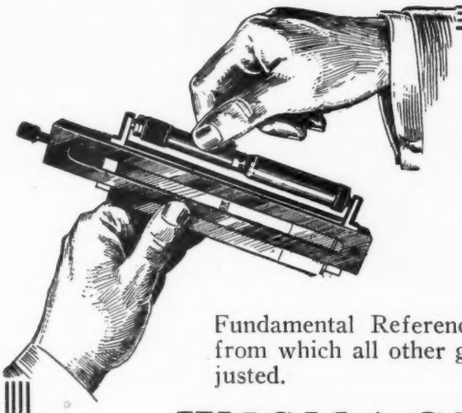

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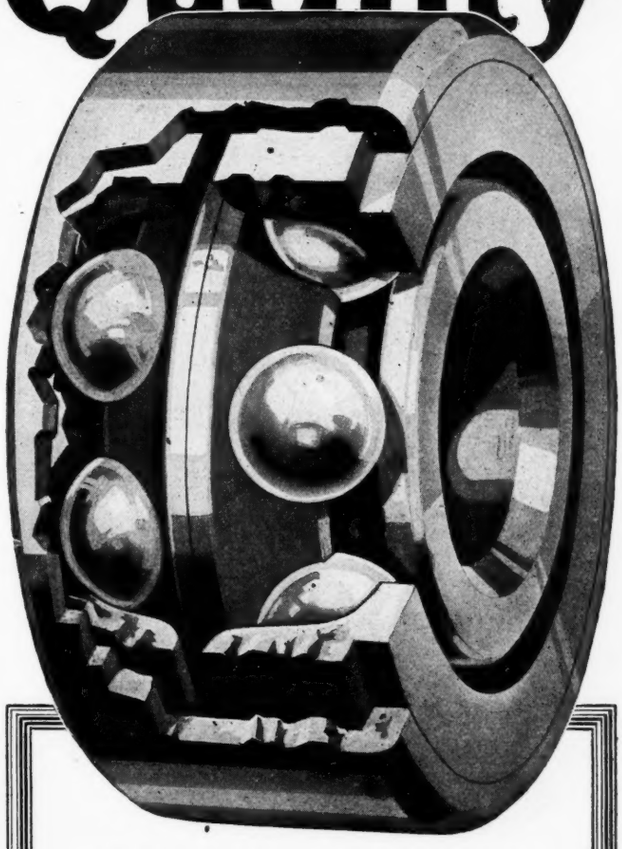

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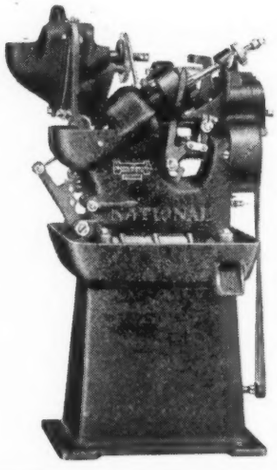

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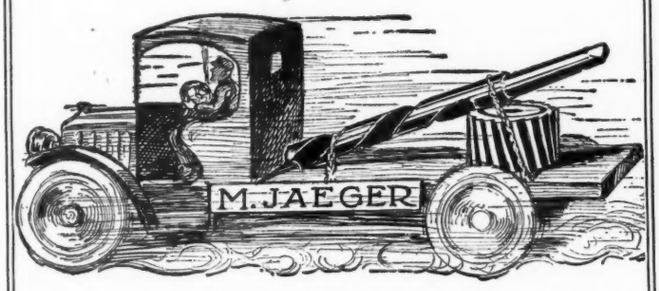

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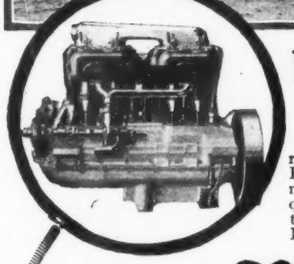

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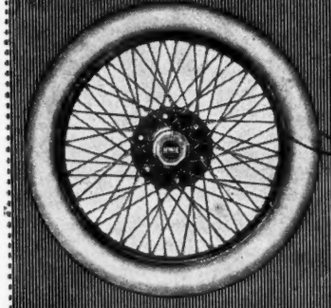

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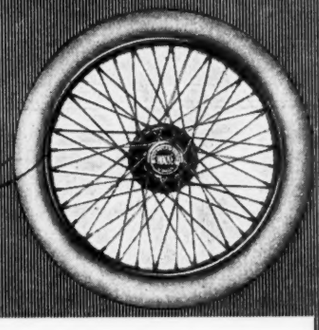

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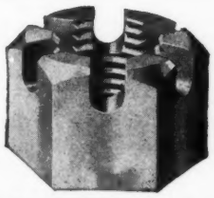

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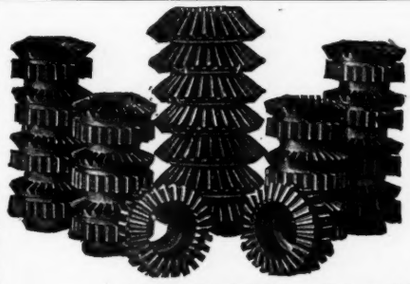

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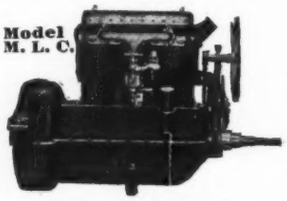

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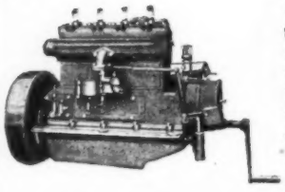

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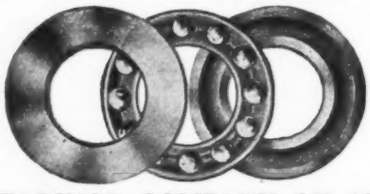

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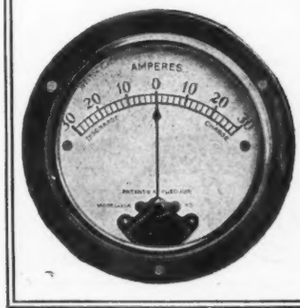

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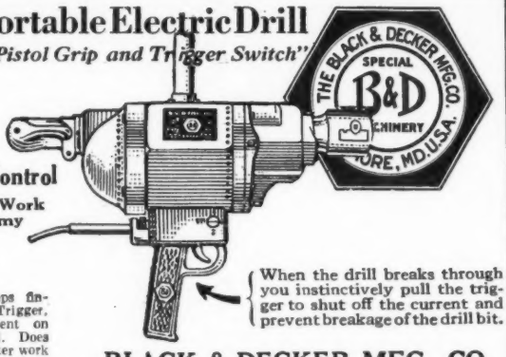

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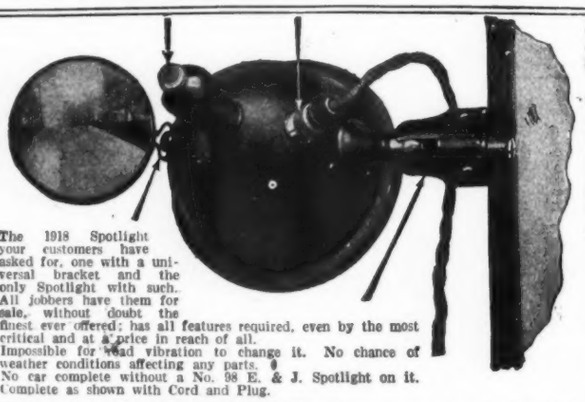

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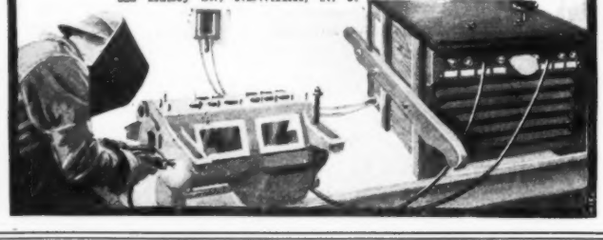

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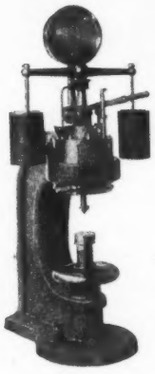

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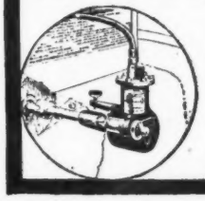

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It is **not** a gear pump.
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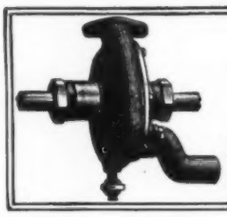
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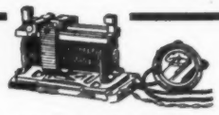
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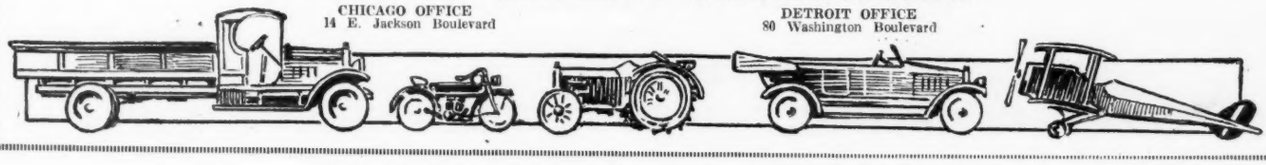

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All Branches of Machine Work
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CONTRACT WORK

Manufacturing and Merchandising Opportunities

The items appearing in these columns form a part of the inquiries received by our Contract Work Service Department during the past three weeks. Manufacturers or concerns interested in these or similar inquiries can secure full information as to how this service is operated by communicating with the Contract Work Service Department, Automotive Industries, 239 W. 39th Street, New York City.

5783 This inquiry is from a Western house and calls for steel and malleable castings, machine parts, metal stampings, springs, bodies; also sheet metal work.

5786 Well established and successful manufacturing concern having up-to-date, fully equipped machine shop is desirous of obtaining small devices which can be made and marketed in large quantities either on a royalty or purchase basis.

5785 A manufacturer located in Syracuse, N. Y., is desirous of sub-letting gear cutting work, also threading.

5787 This inquiry comes from Detroit and covers steel and malleable iron castings.

5788 A concern located in Indiana is looking for a concern to handle gear cutting work.

5798 A large motor corporation located in N. Y. State now engaged in designing a new model car is desirous of being placed in touch with some company who can furnish the axles. The dimensions being a 44" tread with 28" wheels.

5800 Interests in back of this inquiry are looking for capital to finance the developing of a Rotary Gas Engine, which has been strongly endorsed by prominent engineers.

5802 A large automobile manufacturer desires to dispose of the right covering the building of a six-cylinder motor together with all the blue prints, drawings, patterns and machine tool equipment used in making of these motors. This opportunity presents a splendid chance for some concern to make a good motor without having to go through a lot of preliminary experimental work.

5808 A Chicago house is looking for a concern to handle automatic screw machine work.

5815 A metal specialty house located in Chicago is in the market for several hundred thousand drop forgings for Ford connecting rods. Quick action is desired.

5776 Owners of a Patented "No-Glare" prismatic lens which does not impair the efficiency of the lamp desire manufacturing assistance on a royalty basis. Efficient and ornamental and can be cheaply manufactured by any glass manufacturer. Send for descriptive circular and working drawings.

5784 The owner of a patent on a fuel mixer is looking for manufacturing assistance or will dispose of same on a royalty basis. This inquiry is from a party located in Pittsburgh.

5789 Texas interests are looking for manufacturers to take hold of an important automobile accessory. Full details can be obtained from parties back of this inquiry.

5790 The inventor of a patented wheel for pneumatic tires is looking for manufacturing and merchandising assistance. Quick action is desired.

5792 The holders of a patented roller bearing spring are looking for a large manufacturer who is in a position to market the product with automobile manufacturers with a view of supplying these flexible bearings as a stock part.

5793 The manufacturing opportunity back of this inquiry covers magazine oiling system for spring shackles which has been in commercial use for two years and was adopted by the Quartermaster General's office for the Class B Liberty truck, and later for the Ordnance 4-wheel drive tractor. Holder of patents is desirous of licensing the device to motor car and truck builders on a royalty basis. The same interests have perfected for the market an oiling device for Universal Joints that has been thoroughly tested, perfected and tried out. Both propositions present extremely live opportunities.

5794 Ohio interests are looking for manufacturers to take hold of a spark plug that has been in use for several years and has given satisfactory service as well as being very convenient. There is a big demand for a spark plug of this particular construction and it is therefore a proposition of special interest.

5795 Back of this inquiry is a device for truing up crankshaft for which there is a demand in almost every garage and machine shop. A number are already in use in service stations. Can be manufactured in quantity for approximately $5.00. A real opportunity for some automotive concern who is desirous of taking up excess manufacturing facilities.

5796 Eastern interests are looking for manufacturers to take hold of a driving axle for motor vehicles. Holders of patents are desirous of turning over the device either on a royalty or some other basis in order to pave the way for bringing out a fuel oil engine.

5797 This inquiry covers a product that is now being manufactured, the demand for which, however, has outgrown facilities and it is now deemed desirable to turn the entire proposition over to a larger organization and manufacturing interest. The opportunity has to do with a gasoline electric lighting plant, motor and electric pumps. Parties interested state that the demand for lighting plant alone is over $50,000 per year and covers a proposition worth fully investigating.

5799 This inquiry covers a foot accelerator pedal proposition, the concern in back of which is desirous of locating an accessory manufacturer to make on a royalty basis.

5801 The holder of a patent on a towing and steering device is looking for someone to handle same on a royalty or some other basis. It is claimed this is the only adjustable clamp for attaching to any size axle.

5803 The inventor of a gasoline guage for use on motor car (especially adapted to Ford cars), is desirous of communicating with a firm in a position to handle the proposition on a royalty basis or otherwise.

5804 A party located in Maryland has an Automobile lock which he would like to have manufactured on a royalty basis or will enter into some other arrangements.

5805 This inquiry describes a rear emergency hub for Fords, which will prove very useful in repairing an automobile. Party is desirous of getting in touch with some one who will make this hub and market it on a royalty basis or will enter into some other manufacturing arrangement.

5806 The designer of a method of feeding liquid fuels to the cylinders of an internal combustion engine, also a device for applying the method would like to get into communication with manufacturers able to develop and market the device on a royalty basis.

5809 Interests in back of this proposition want to get in touch with manufacturers or others who would be interested in obtaining the patent rights or in manufacturing a transmission mechanism.

5810 Party looking for manufacturing assistance on a patented demountable hub.

5811 This proposition covers a conventional simple, economical and very practical design for a three plow tractor completed and ready for some manufacturer to take hold of and build the first experimental machine.

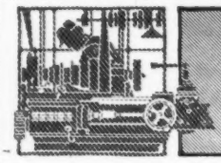
5812 The holder of a patent on a detachable folding parcel carrier for Automobile running boards will dispose of same on a royalty or some other basis.

5813 Interest back of this inquiry wants to sell outright all sales, manufacturing and patent rights of a gasoline engine driven automatic cream separator, or will sell sales rights on a royalty basis. Also makes the same proposition on a hand driven cream separator.

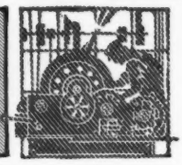
5814 This inquiry covers five patented auto truck devices, the owner of which is looking for manufacturing assistance or will dispose of on a royalty basis.

5816 The holder of patent on non-glare automobile headlight (not a lens) is looking for either capital to manufacture same or will grant exclusive license on royalty basis to responsible party. This party also holds a foreign patent on the above. This is a stamping proposition that should appeal to manufacturers who have been on war work.

5817 A party located in California who is the owner of a patent on an automobile air jack is looking for manufacturing assistance, or will consider either a cash or royalty proposition.



USED AND REBUILT MACHINERY



IMMEDIATE SHIPMENT

230 VOLT D. C. MOTORS

No.	HP	RPM	Wdg.	Type	Make
1	¼	975	Sh.		Westinghouse
2	1	750	Series	D	Mach. App.
1	3	1100	Sh.	Form A	General Electric
1	5	1650	Sh.	C	General Electric
3	7½	850	Sh.	A	Gibbs
1	7½	1100	Sh.	Class 4	General Electric
1	10	750	Sh.	MP	Burke
3	10	750	Sh.	MP	Northwestern
1	10	1700	Cp.	MP	Burke
1	10	1150	Cp.	SK	Westinghouse
1	15	925	Sh.	CVC	General Electric
1	15	1750	Cp.	CVC	General Electric
1	15	650	Sh.	MP	Triumph
1	15	725	Cp.	MP	Northern
1	15	800	Sh.	CM	Crocker Wheeler
1	17½	600	Sh.	A-14	Gibbs
1	17½	585	Sh.	A-14	Gibbs
1	20	650	Sh.	MP	Burke
1	20	975	Sh.	MP	Fairbanks Morse
1	20	900	Sh.	MP	Hobart
1	20	800	Sh.	MP	Imperial
1	20	650	Sh.	MP	Milwaukee
1	20	975	Sh.	S	Westinghouse
1	20	600	Sh.	MP	Western Electric
1	20	750	Sh.	MP	Northern
1	25	650	Sh.	MP	National Brake
1	25	775	Sh.	MP	Western Electric
1	25	675	Sh.	CL	General Electric
2	25	800	Cp.	MP	Northern
1	25	700	Sh.	MP	Allis Chalmers
1	25	575	Sh.	MP	Northern
1	30	600	Sh.	MP	Burke
1	30	250/800	Cp.	MP	General Electric
1	33	610	Sh.	GL-B	General Electric
1	40	975	Cp.	GL-B	General Electric
1	40	675	Sh.	MP	Northwestern
1	40	850	Cp.	S	Westinghouse
1	40	550	Sh.	M	Westinghouse
1	50	850	Sh.	S	Westinghouse
1	50	625	Sh.	MP	Northern
1	50	625	Sh.	A-40	Milwaukee
1	50	950	Cp.	CCD	Crocker Wheeler
1	55	585	Sh.	6½AOR	Western Electric
1	75	850	Sh.	—	Milwaukee
1	80	633	Cp.	CQ	General Electric
1	120	450	Cp.	MP	General Electric
1	130	550	Cp.	S	Westinghouse
1	134	650	Cp.	MP	Morgan Gardner
1	150	680	Cp.	MP	Jenny
1	400	200	Cp.	MP	General Electric
1	165	650	Cp.	M	Westinghouse
1	300	340	Cp.	CCD	CrockerWheeler

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11	5	1800	AN	110.00
10	5	1200	AN	140.00
4	7½	1800	AN	225.00
3	7½	1200	AN	254.00
11	10	1800	AN	258.00
3	7½	900	AN	309.00
13	10	1200	AN	214.00
3	10	900	AN	375.00
1	15	1800	AN	284.00
4	15	1200	AN	392.00
6	15	900	AN	419.00
4	20	1200	AN	412.00
3	20	900	AN	461.00
1	25	1800	AN	396.00
3	25	1200	AN	467.00
9	30	1200	AN	517.00
6	30	900	AN	598.00
3	40	1200	AN	598.00
5	40	900	AN	670.00
2	50	1200	AN	667.00
6	50	900	AN	744.00
1	75	900	AN	959.00
1	100	690	AN	1200.00
1	150	720	AN	1667.00
1	200	720	AN	1980.00
1	200	720	AN	1772.00

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No.	H.P.	R.P.M.	Type	Price
1	100	900	ANY	$1545.00
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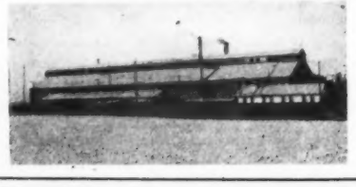

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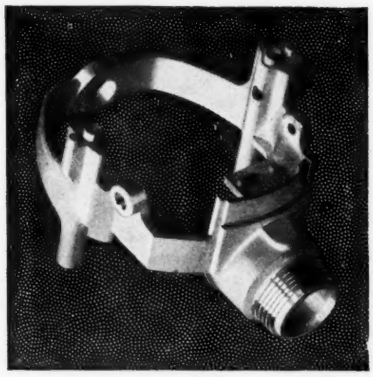

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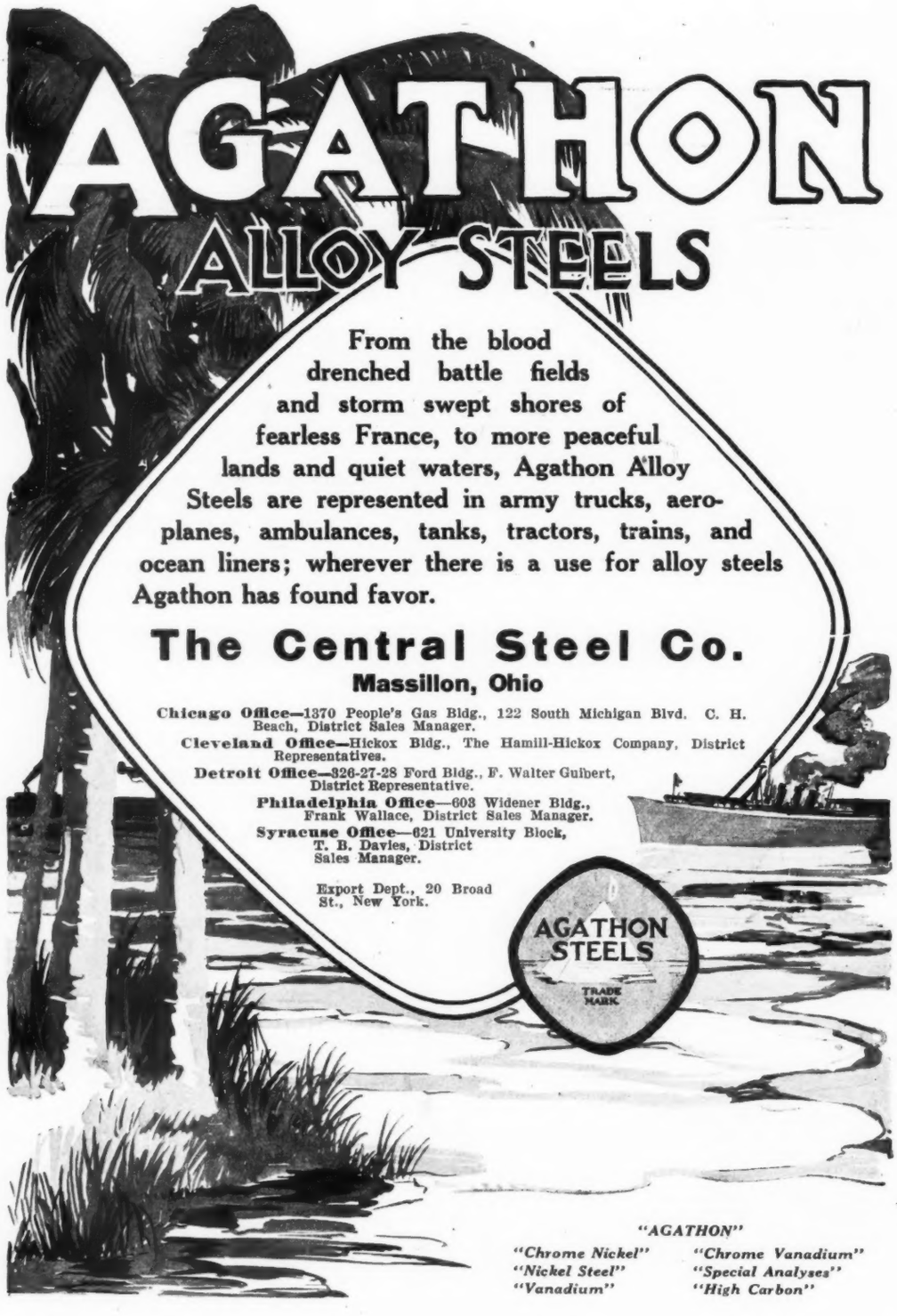
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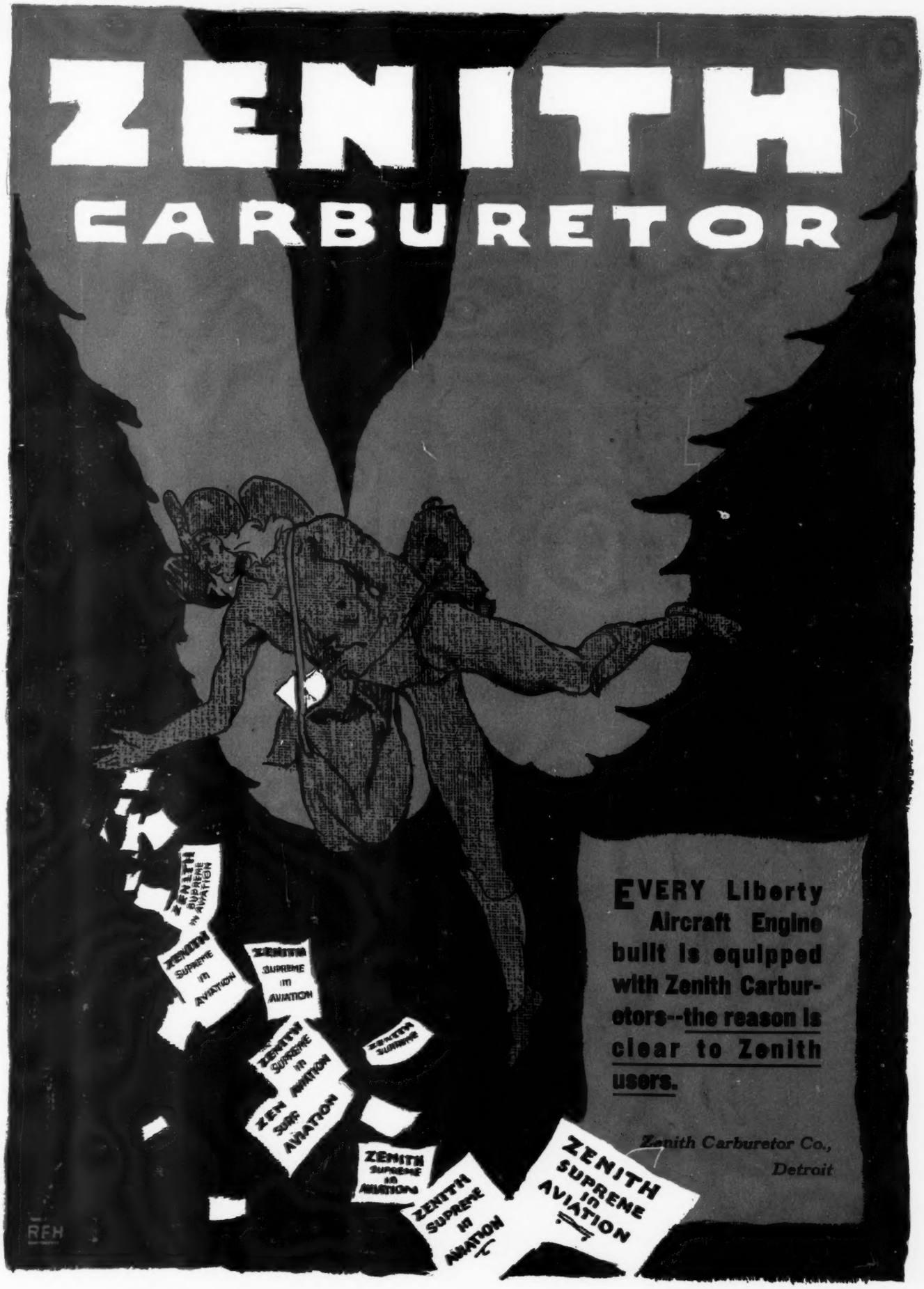
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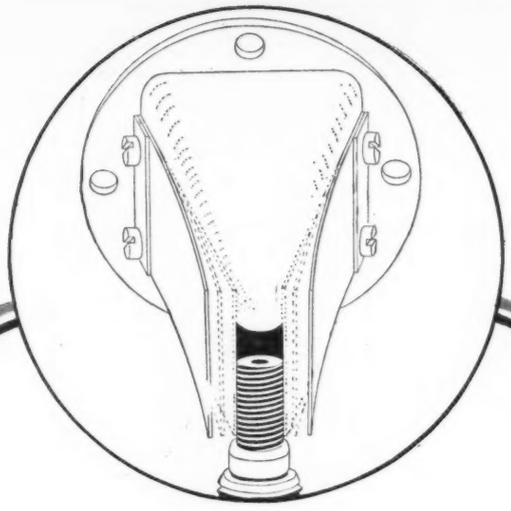

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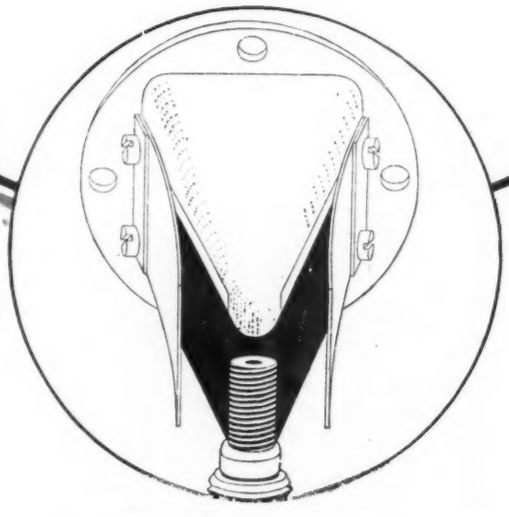
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